May 12, 1958

Paper Trade Journal

Technical Education — Industry and supplier top executives meet at University of Maine to discuss education requirements.

Paper Machine Drives — How Scott Paper Co. obtained machine speed-ups at minimum cost through use of new type pulley and belting.

Industrial Liquid Meters — St. Regis Paper Co. at Deferiet, N. Y. obtains accurate control of starch mixes and clay slurries.

Drying Paper — Theoretical discussion of mechanism of water evaporation from a moving web heated by cylindrical dryers.

MOORE & WHITE
DUPLEX BOARD CUTTER
and Air-Controlled
DUPLEX SLITTER

Rugged Construction
for 'round the clock
operation . . .
On the Machine

The DUPLEX CUTTER can be adjusted while in operation for changes in lengths. A special feature also permits adjustment of draw between sections, assuring accurate cutting even when varying sheet conditions occur.
The DUPLEX SLITTER is designed particularly for use with the M. & W. Duplex Cutter but will also give excellent results with any other cutter. Changes in widths can be made in seconds while machine is in operation.

The MOORE & WHITE Company

330 East Hunting Park Avenue, Philadelphia 24, Pa. GArfield 6-9439
West Coast: Stephen Thurlow Co., 1731 First Ave. South, Seattle 4, Wash.

University Microfilms
Att: E B Power
313 N First St.
Ann Arbor, Mich.

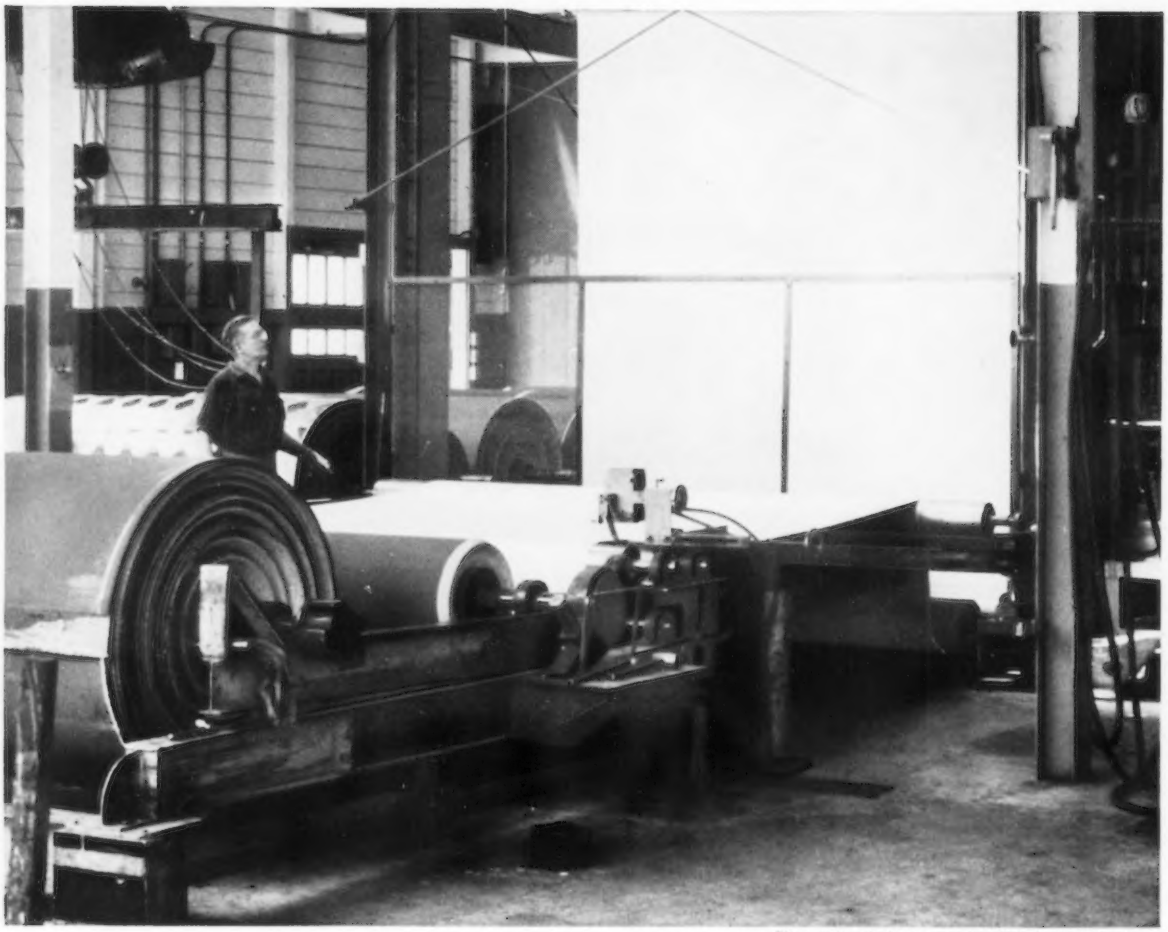

Photo courtesy Bird & Son, Inc., East Walpole, Massachusetts

It prints a new pattern of profit

A new way of printing patterns has resulted in a new low-cost, printed flooring—featuring high gloss, smoothness, striking detail and depth of color, with good wearing properties.

A nine-foot offset rotogravure press is used by Bird & Son, inc., to print the highly decorative, multi-color patterns in great detail. The only one of its kind, this press turns out patterns nearly 100 times sharper than those obtained with the usual flat bedblock print ordinarily used on felt base.

Key to the successful reproduction of these patterns is a white, printing base coat made with PLIOLITE LATEX. This highly pigmented film prevents the asphalt base from bleeding through and presents an adhesive surface for good printing with good binding of the vinyl topcoat. PLIOLITE LATEX is used because of its excellent uniformity, compatibility and stability.

Undercoats are but one of many uses for PLIOLITE LATEX and related latices. Learn more about how they can help you to new products and profits by writing for details plus the latest *Tech Book Bulletins* to:
Goodyear, Chemical Division, Dept. Q-9427 Akron 16, Ohio.

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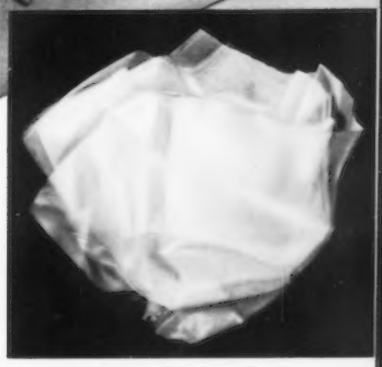
PENT-UP ENERGY destroys paper...

It can crack a roll like a dried log. It is also a major reason for costly snap-offs when feeding to printing presses or converting processes.

CAMERON

Automatic Roll Density Controller*

PUTS PAPER TO SLEEP!

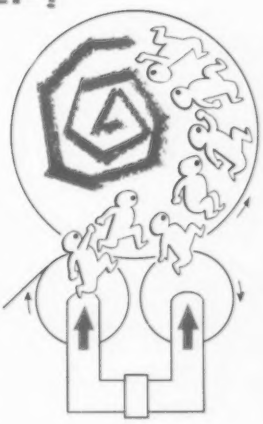


Crumple a piece of paper and toss it on your desk. The small measure of energy applied by your hand is stored in the paper. Watch the paper move, stretching and twisting, as the pent-up energy seeks release. **In a similar way,** the winding operation stores active energy in paper rolls. This pent-up energy, seeking release, is a major cause of damage to paper in shipping and storage.

HERE'S HOW IT WORKS:

(see diagram at right)

At the start of the run the rewind drums and riding roll are driving the rewind roll to assure tight starts and firmly set cores.

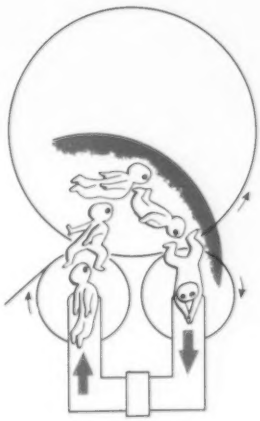


(see diagram below)

At a predetermined diameter the Automatic Roll Density Controller is engaged. As the rewind roll increases in diameter the Density Controller absorbs an increasing amount of energy from the rewinding roll... removing energy that would normally be "locked in" the rewound roll. Most of the energy removed from the rewinding roll is regenerated and fed back to the main drive.

The fully Automatic Roll Density Controller provides optimum roll quality . . . rolls that will not burst, but firm enough to be shipped and handled without "flatting" or other damage.

In contrast to the principle of absorbing energy by speed differential between rewind drums, the Automatic Roll Density Controller absorbs energy externally, avoiding scuffing and scratching of the sheet... there is no slip of the roll relative to the rewind drums.



The Cameron Automatic Roll Density Controller is another example of the time-and-money-saving inward excellence of Cameron winders. Cameron specialists welcome any opportunity to show the way to dependable, low cost, high speed production of better rolls of any material.

* PATENT APPLIED FOR

In a few seconds, the energy stored in the crumpled paper has been released. The paper will now remain "asleep" indefinitely. **The energy** stored in paper rolls by the winding operation is removed by the **CAMERON Automatic Roll Density Controller.** The Density Controller puts the paper to sleep, eliminates snap-offs caused by rolls wound too hard, permits winding larger diameter rolls to feed presses through longer running time, reduces damage in shipping and storage.

Cameron Machine Company, Franklin Road, Dover, N. J.

Canada: Cameron Machine Co. of Canada, Ltd., Royal Bank Bldg., Toronto 1

France: Batignolles-Chatillon, 5 Rue De Monttessuy, Paris (7e) France

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50 years devoted exclusively to the design and manufacture of slitting and roll winding equipment.

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SCAPA Synthetic Reinforced* Cotton Dryer Felt

Type ※1164-S and ※1166-S

Running up to double life of competitive cotton felts—outrunning asbestos felts in many cases—bringing the advantage of faster drying found only in cotton felts.

Scapa staggered-butt clipper seam using synthetic tapered webbing is engineered to give the extra life required from these longer running Scapa felts.

Prompt, dependable shipments from our new mill at Waycross, Georgia, including all widths from the smallest felt through the widest felts in the country.

*U.S. Patent Application Serial No. 524410

Can be furnished with our famous GREEN DACRON EDGE when desired (U. S. PATENT 2,612,190). These reinforced edges of pure, spun Dacron will outwear the felt, under the most severe conditions.

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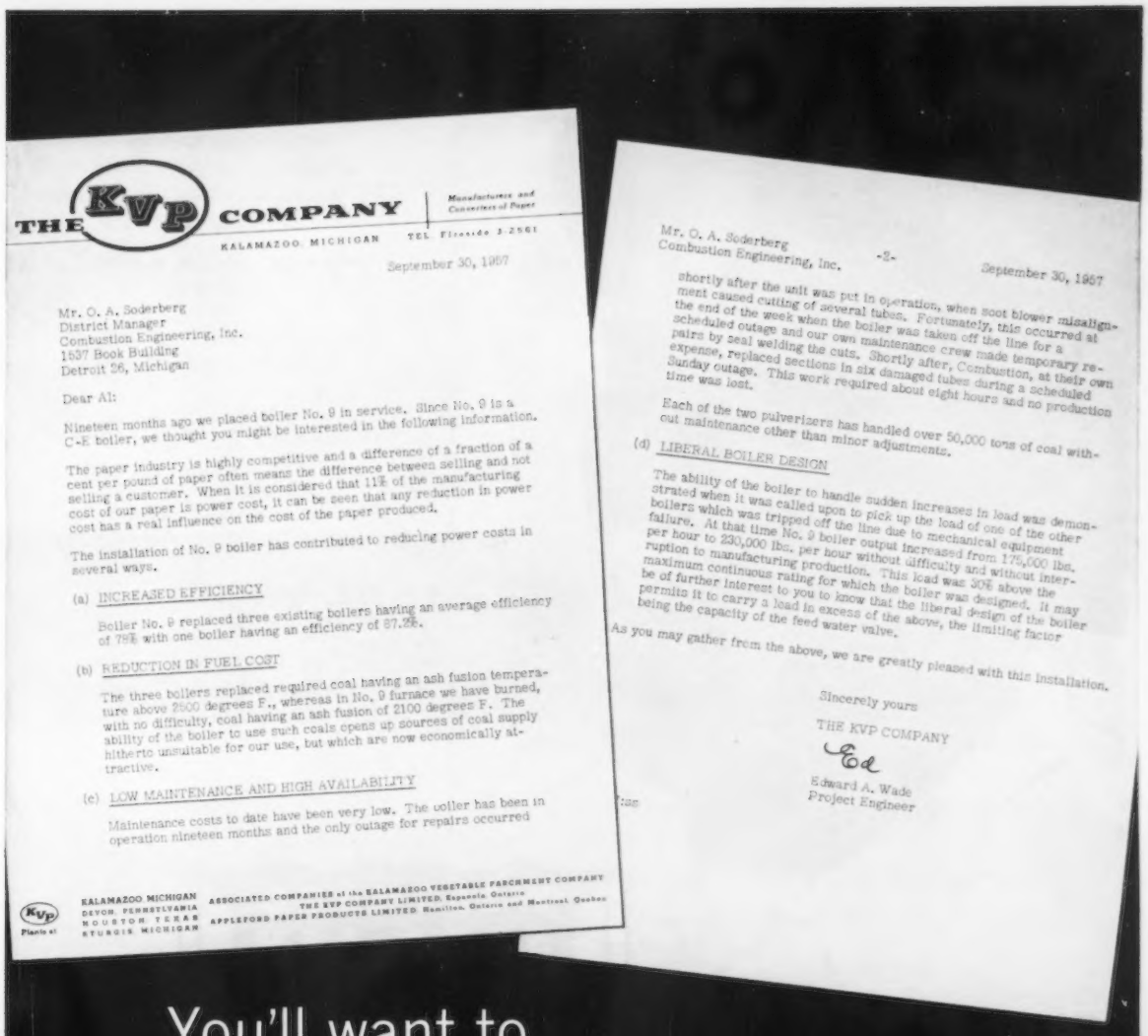

THE KVP COMPANY

Manufacturers and Converters of Paper

KALAMAZOO MICHIGAN TEL Fireside 3-2561

September 30, 1957

Mr. O. A. Soderberg
District Manager
Combustion Engineering, Inc.
1537 Book Building
Detroit 26, Michigan

Dear Al:

Nineteen months ago we placed boiler No. 9 in service. Since No. 9 is a C-E boiler, we thought you might be interested in the following information.

The paper industry is highly competitive and a difference of a fraction of a cent per pound of paper often means the difference between selling and not selling a customer. When it is considered that 11% of the manufacturing cost of our paper is power cost, it can be seen that any reduction in power cost has a real influence on the cost of the paper produced.

The installation of No. 9 boiler has contributed to reducing power costs in several ways.

(a) INCREASED EFFICIENCY

Boiler No. 9 replaced three existing boilers having an average efficiency of 78% with one boiler having an efficiency of 87.2%.

(b) REDUCTION IN FUEL COST

The three boilers replaced required coal having an ash fusion temperature above 2600 degrees F., whereas in No. 9 furnace we have burned, with no difficulty, coal having an ash fusion of 2100 degrees F. The ability of the boiler to use such coals opens up sources of coal supply hitherto unsuitable for our use, but which are now economically attractive.

(c) LOW MAINTENANCE AND HIGH AVAILABILITY

Maintenance costs to date have been very low. The boiler has been in operation nineteen months and the only outage for repairs occurred

KVP Plants at: KALAMAZOO MICHIGAN; DEVON, PENNSYLVANIA; HOUSTON, TEXAS; STURGIS, MICHIGAN

ASSOCIATED COMPANIES of the KALAMAZOO VEGETABLE PARCHMENT COMPANY: THE KVP COMPANY LIMITED, Espanola, Ontario; APPLEFORD PAPER PRODUCTS LIMITED, Hamilton, Ontario and Montreal, Quebec

Mr. O. A. Soderberg
Combustion Engineering, Inc. -2- September 30, 1957

shortly after the unit was put in operation, when soot blower misalignment caused cutting of several tubes. Fortunately, this occurred at the end of the week when the boiler was taken off the line for a scheduled outage and our own maintenance crew made temporary repairs by seal welding the cuts. Shortly after, Combustion, at their own expense, replaced sections in six damaged tubes during a scheduled Sunday outage. This work required about eight hours and no production time was lost.

Each of the two pulverizers has handled over 50,000 tons of coal without maintenance other than minor adjustments.

(d) LIBERAL BOILER DESIGN

The ability of the boiler to handle sudden increases in load was demonstrated when it was called upon to pick up the load of one of the other boilers which was tripped off the line due to mechanical equipment failure. At that time No. 9 boiler output increased from 175,000 lbs. per hour to 230,000 lbs. per hour without difficulty and without interruption to manufacturing production. This load was 30% above the maximum continuous rating for which the boiler was designed. It may be of further interest to you to know that the liberal design of the boiler permits it to carry a load in excess of the above, the limiting factor being the capacity of the feed water valve.

As you may gather from the above, we are greatly pleased with this installation.

Sincerely yours

THE KVP COMPANY

Edward A. Wade
Project Engineer

You'll want to read this letter...

... if you're going to be in the market for boilers in '58!

C-E offers a type and size of boiler for every steam requirement — from 4,000 to 4,000,000 pounds per hour — and recently was awarded a contract for a boiler in the latter size class which will be the biggest boiler ever built.

COMBUSTION ENGINEERING

Combustion Engineering Bldg., 200 Madison Ave., New York 16, N. Y.

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

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Toss a handful of Westvaco Soda Ash upwind and you'll instantly see that it is essentially dust free—when made, when shipped, when unloaded *and* when used.

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Westvaco Soda Ash is different and better. It is composed of billions of tiny, needle-like crystals which degradate less in handling . . . don't break down into fine dust . . . don't create dusting problems. In addition, our Soda Ash is of uniformly high purity, free-flowing, low in iron and other discolorants. It disperses and dissolves quickly and completely.

We'd like to quote on a fair share of your needs. It's quite possible that you can get premium-quality Westvaco Soda Ash without paying a penny more. So let's talk things over—soon!

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PAUL D. VAN DERVEER
Associate Editor

R. E. THUEMMES
Associate Editor

J. A. BROPHY
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LOCKWOOD TRADE JOURNAL CO., INC.

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REMEMBER THESE DATES

May 14-16: TAPPI Coating Conference, Bedford Springs Hotel, Bedford Springs, Pa.

May 20, 21: National Paperboard Assn. Spring Meeting; Santa Barbara Biltmore Hotel, Santa Barbara, Calif.

June 2-4: Technical Section, CPPA, Summer Meeting, Chateau Frontenac, Quebec City.

June 3-5: Superintendents' Assn. Annual Meeting Statler Hotel, Boston, Mass.

July 28-Aug. 1: TAPPI Engineering Conference, Multnomah Hotel, Portland, Ore.

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Brown Starts Up Magnesium Base Operation

Charmin Reopens Cheboygan Mill

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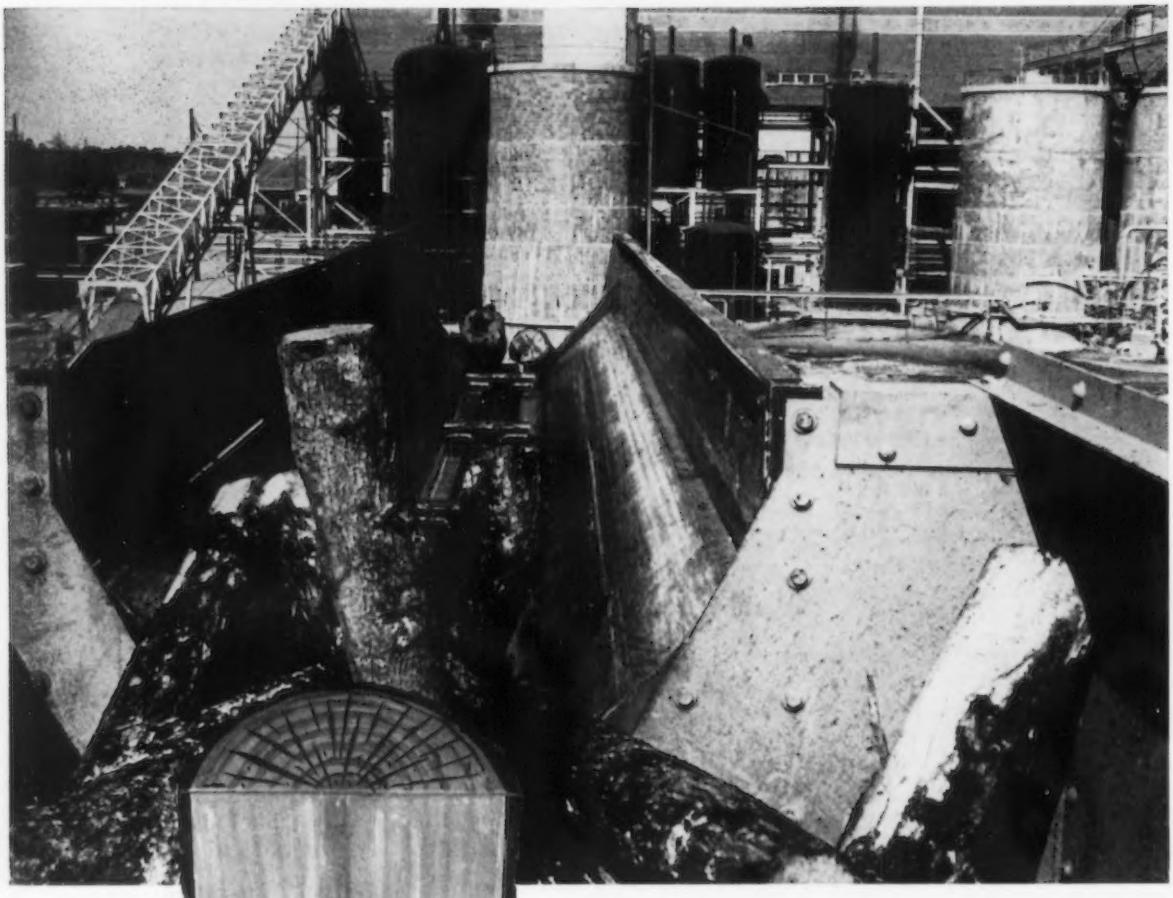

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IT'S THE SAME LOG

Hewn flat on one side, the pupil sat on one end, the teacher on the other. Such was the seat of learning in early America.

Now it is converted into paper, which brings enlightenment to millions.

The means is cellulose processing in which fabricated steel products from Wyatt's shops are essential.

Wyatt's Plastics, Inc., for the application of plastic and rubber products in paper making.

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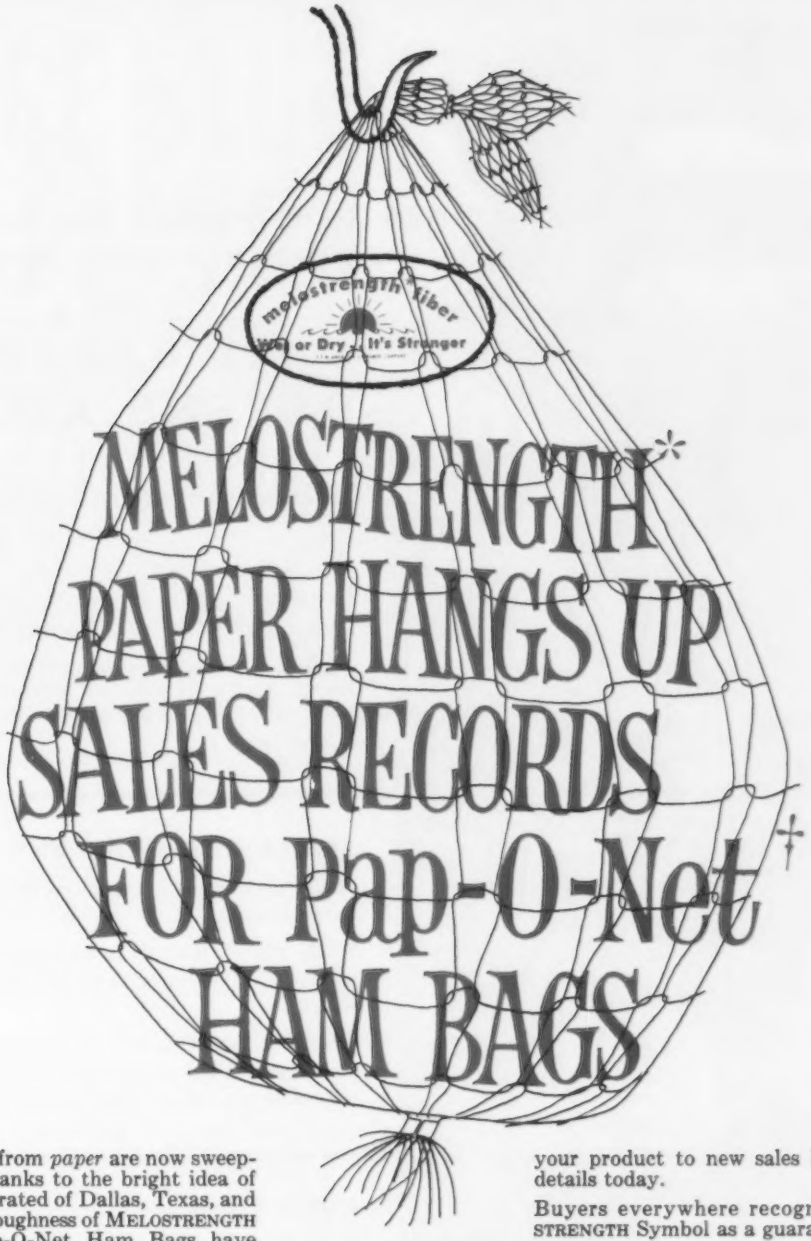

MELOSTRENGTH* PAPER HANGS UP SALES RECORDS FOR Pap-O-Net† HAM BAGS

Ham bags knitted from *paper* are now sweeping the market, thanks to the bright idea of Enterprise Incorporated of Dallas, Texas, and the extraordinary toughness of MELOSTRENGTH Paper. These Pap-O-Net Ham Bags have proved stronger and cheaper than cotton. *And* the ham tastes better because the wide mesh allows faster, deeper smoke penetration. Yet MELOSTRENGTH Paper easily supports the dead weight of ham as it sweats and oozes fat during smoking.

You, too, can benefit from the outstanding qualities of MELOSTRENGTH Paper and the invaluable merchandising aid of the nationally promoted and recognized MELOSTRENGTH Symbol. The sales appeal of wet strength, plus the MELOSTRENGTH Symbol, can push your product to new sales highs. Write for details today.

Buyers everywhere recognize the MELOSTRENGTH Symbol as a guarantee that:

Wet or Dry—It's Stronger . . . stands up even when soaked

It's Non-Linting . . . wipes clean without shedding

It's Highly Resistant . . . to chemicals and acids generally

It Has Lasting Strength . . . in continuous hard use or in storage

Cyanamid supplies MELOSTRENGTH® Resin for the manufacture of MELOSTRENGTH Paper. MELOSTRENGTH Paper is available in practically every weight and grade from mills across the country.

†Reg. U.S. Pat. Off. Enterprise Incorporated
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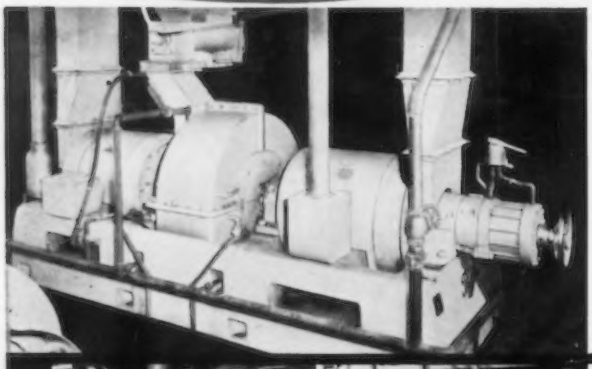
3 REFINER DESIGNS CAN HANDLE TODAY'S PULP REFINING PROBLEMS

and

ONLY BAUER OFFERS ALL 3

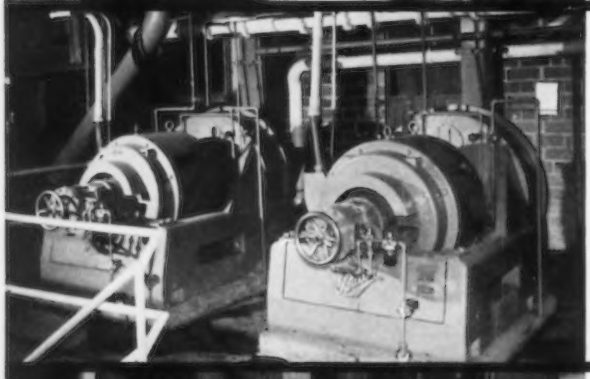


DOUBLE REVOLVING DISC

Bauer double revolving disc refiners are used in this semi-chemical system.

SIZES: ranging from twin 24" discs powered by two 100 HP motors up to 40" twin discs with two 400 HP motors.

APPLICATIONS: Because of their high differential speeds, double revolving disc refiners are recommended when highest quality fiberizing or dispersing is the main requirement.



SINGLE REVOLVING DISC

These Bauer single revolving disc refiners are producing fiberized stock from ground-wood screenings.

SIZES: from a small laboratory model with an 8" disc and a 10 HP motor, up to 40" disc refiners with 800 HP motors.

APPLICATIONS: Excellent for refining long, stringy, fiberous pulp or for stock when strength development or high crush are the principal needs.

PUMP-THRU

Bauer Pump-Thru refiner gives stock final refining in this semi-chemical corrugating medium mill.

SIZES: 32" disc, with up to 400 HP motor; 44" disc, with up to 800 HP motor.

APPLICATIONS: For stock preparation and specific fiberizing operations. Combines efficiency of a disc mill with the advantages of a jordan. Automatic controls available.

FOR SPECIFIC RECOMMENDATIONS...

THE BAUER BROS. CO

1758 SHERIDAN AVENUE
SPRINGFIELD, OHIO

DISC REFINER HEADQUARTERS

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index

ledger

bond

nondusting acid dye for beater application

Added dry to the beater, Fast Bond Blue GDX produces clear, bright shades of lightfast blue in cover, bond, ledger and index papers. In combination with Brilliant Pure Yellow 6GS Extra Conc. it produces very bright greens.

Fast Bond Blue GDX has the unique property of yielding shades of minimum two-sidedness and insensitivity to dryer heat in unfilled papers. However, in loaded papers run at moderate speeds, it yields deeper shades on the wire side than on the felt side.

For further information about Fast Bond Blue GDX, or assistance with any paper dyeing problem, please contact our Technical Service Department or nearest sales office.

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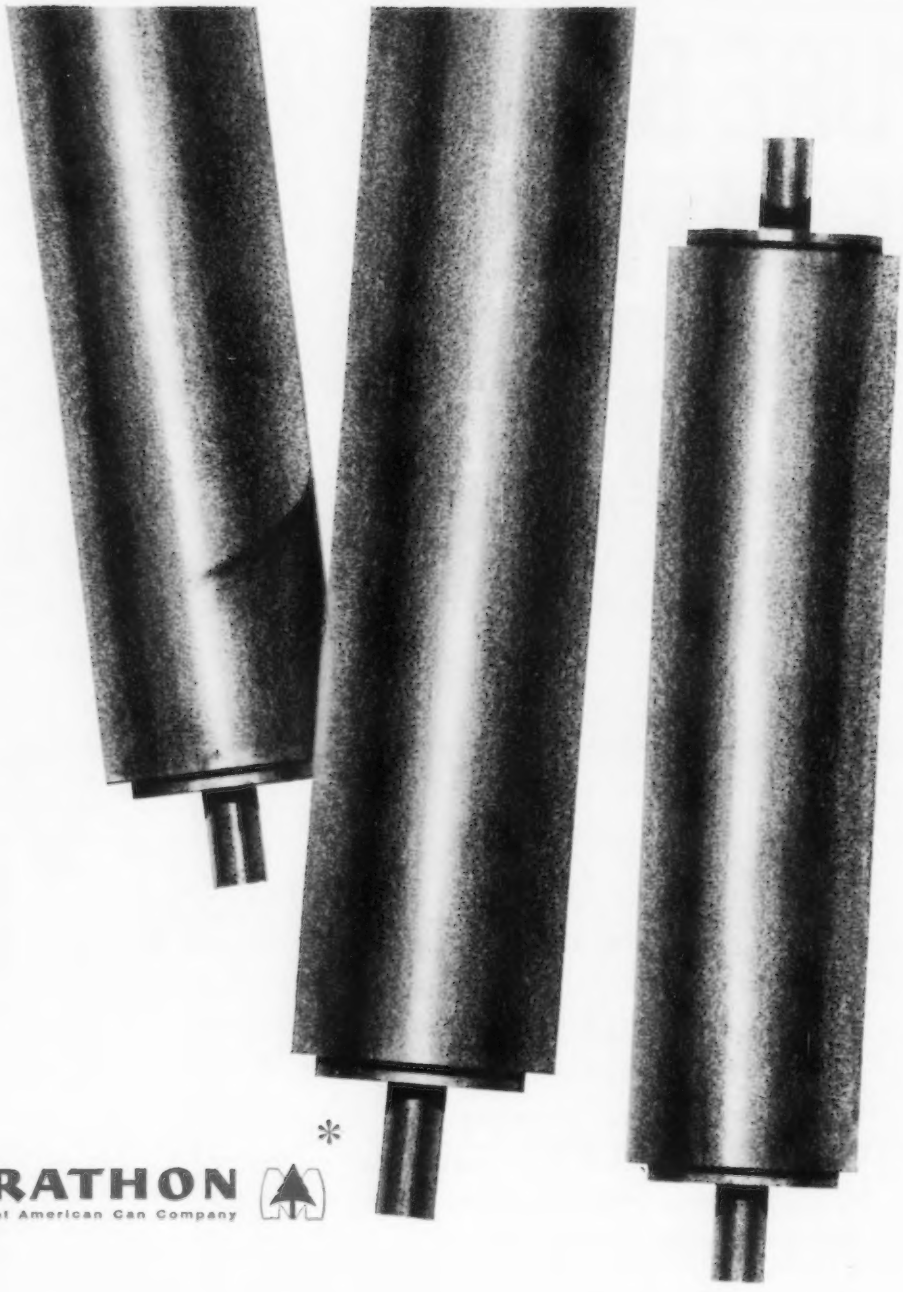


MARATHON *

A Division of American Can Company

* 25 of the 25 largest paper companies use S-W rolls and roll re-covering service.

S-W . . . *roll service puts more profit in paper.*

STOWE-WOODWARD, INC. Griffin, Georgia • Newton Upper Falls, Mass. • Neenah, Wisconsin
On the West Coast: HUNTINGTON RUBBER MILLS, INC., Seattle 88, Washington

Red Scare in Pulp and Paper

Offering of some low price spot tonnage of Russian unbleached sulphite pulp here has prompted a scare article in a widely circulated news letter. Promotion of such panic may be a principal purpose of the offering. Author of the item confuses forestry and pulp and paper (they are not synonymous) and shows complete lack of knowledge of technological developments in the Russian industry and of its size and expansion plans. An authoritative article on pulp and paper manufacture in Russia in our Jan. 20, 1958 issue indicates that she will not be able adequately to take care of her own requirements in the next five to ten years. Some time later she might be in a position to upset world markets. It takes more than trees to make a big pulp and paper industry.

Future Timber Outlook Surveyed

"If Americans are to have the timber they need in the years ahead we must begin now to put our forest house in better order. The potential of the land is adequate." This is the most significant conclusion to be drawn from "Timber Resources for America's Future" a 700-page report just released by the U.S. Dept. of Agriculture. This book says the best possibilities for increasing timber supplies are to: Plant billions instead of millions of seedings every year; Step up control of fire, insects and diseases; Use more timber now cut and left in woods or wasted at mill and use more dead and cull trees; and make recently cut lands more productive. Highlights of the report will be reproduced in an early issue of *Paper Trade Journal*.

East-West Differences In Waste Paper

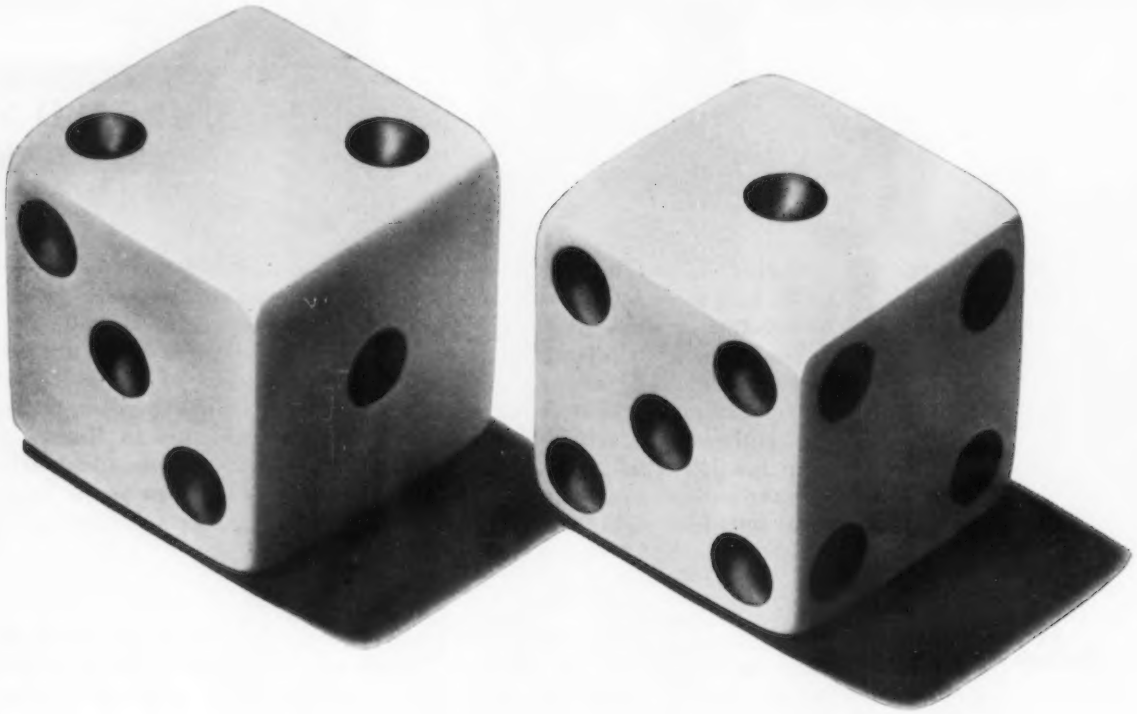
While news grades have continued soft in the East in spite of easing prices, paradoxically these grades are up $2 per ton in Los Angeles for May (unchanged in Mid-West). Hard white envelope cuts slipped about $10 in New York, Boston and Chicago, and were unchanged on West Coast. Off in Chicago only are new kraft corrugated cuts, kraft envelope cuts and unprinted bag waste.

Kraft Wrappings Prices Cut

Price of kraft wrapping paper (counter rolls) have been cut about $10 a ton. The cut is said to have been started by smaller companies seeking more business and the larger companies were forced to follow. The cut now appears to be universal in the East. Prices of similar grades used for bags, multiwall sacks etc. were not affected.

Investment Banker Looks at Us

"Right now the market acceeds paper stocks a rather favorable appraisal and appears to be saying that perhaps things are not as dark as they seem," says a vice president of Blyth & Co. in an article in this issue. He also reports a prediction anticipating slow improvement in demand for our products in the second half with strong recovery in the first quarter of 1959. Other important features of this speech, presented during the Pulp and Paper Foundation meeting at the University of Maine, are comments on mergers and over-expansion and a plea for more extensive research by our industry.



Don't Gamble!

ONLY the Rice Barton Trailing Blade Coater has been proven by 10 years of research and development.

ONLY the Rice Barton Trailing Blade Coater has been proven by 42 successful commercial installations.

ONLY the Rice Barton Trailing Blade Coater is a sure thing!

RICE BARTON

RICE BARTON CORPORATION

WORCESTER, MASSACHUSETTS

Paper Machinery Builders Since 1837

K-C Not to Buy Chihuahua

Kimberly-Clark Corp., Neenah, Wis., has concluded its technical contract at the Anahuac Mill of Celulosa de Chihuahua. The rebuilding and training program, undertaken by Kimberly-Clark at the request of Celulosa officials nearly two years ago, has resulted in many improvements in design and operation of the bleached sulphate pulp manufacturing process, with the result that the mill will now produce better grades of pulp.

At the time this project was undertaken, Kimberly-Clark was given an option to purchase a substantial interest in Celulosa, but it subsequently decided against acquiring any ownership and the option was allowed to expire on December 31, 1956.

Dr. Ladislav Rys, a prominent pulp and paper consultant for Latin American countries, has been retained by Celulosa de Chihuahua as technical director of the mill operations.

Brown Starts Up Magnesium Base Operation

Continuous operation of its new $5,500,000 Sulphite mill chemical recovery plant at Berlin, N. H. began by Brown on the first of this month. Construction of the plant started in 1956 with experimental runs commencing in January of this year.

The new recovery furnace is the largest of its type in the world and the first ever built in the eastern section of the United States. In full operation the plant will burn the greater part of waste sulphite liquors from Brown Co.'s 400-ton per day Burgess pulp mill, almost entirely eliminating the discharge of sulphite mill wastes into the Androscoggin River. The new installation also recovers chemicals used in the pulping process and at the same time generates additional steam as a by-product. The installation required the conversion of Brown Co.'s sulphite mill to a magnesium-base cooking process.

Inland Stock Offer Draws Suit From Gen'l Box

General Box Co. has asked an injunction to prevent Inland Container Corp. from buying General Box stock.

General Box, in a suit filed in federal district court in Chicago, charged violations of the Clayton antitrust law and the securities and exchange act.

Inland Container of Indianapolis, Ind., has requested tenders from the 4,038 General Box stockholders to buy their shares at three dollars apiece. The stock currently is selling at $2.87 on the Midwest Stock Exchange.

General Box, in recommending that shareholders reject the Inland offer, contended that General Box has a 22 year straight dividend record, that its shares have a net value of $4.06, that better offers could be obtained and that a recession period is not the time to sell.

Charmin Reopens Cheboygan Mill

Procter & Gamble's new papermaking subsidiary, Charmin Paper Products Co., has announced the reopening and expansion of its Cheboygan, Mich., paper mill.

No Bidders for Rogers Wood in Colorado

The U. S. Forest Service had no bids to open on the proposed sale of 195,000 cords of beetle-killed spruce timber on the White River National Forest near Glenwood Springs, Colo.

The bids were to have been opened April 29 at the regional forest service headquarters in Denver.

The timber offered for sale was part of a block which was contracted to the J & J Rogers Co. of New York in 1956. The company notified the Forest Service last year that it would be unable to build its multi-million dollar plant and the contract for some three million cords was canceled.

The bid invitation called for a price of $1.05 a cord with terms that the successful bidder remove it within ten years. Mr. Nelson reported the timber sale was not a "dead issue," saying that he expected pulp wood buyers to request a reopening of bids later this year.

Oppose Tax Concessions to Irving

Opposition is being raised to the very generous municipal tax concessions proposed for the Irving Pulp and Paper Co.'s new paper mill in New Brunswick.

The agreement between Irving and the city of Lancaster requires the approval of the provincial legislature and the enabling bill is receiving active opposition. The proposed paper mill would be located in the vicinity of the present Irving pulp mill.

East Texas P & P Claims Largest Planting

The largest pine tree seedling planting project ever conducted by private industry on one contiguous land ownership has just been completed by the East Texas Pulp and Paper Co., R. M. Buckley, company president, has announced.

The program involved the planting of 20,200,000 loblolly seedlings over a spread of 23,000 acres in eight East Texas counties. "The job took three and a half months to complete and was carried out by a special crew of approximately 90 men and 36 machine planting units each composed of a tractor and planter", Mr. Buckley said.

First Quarter Canadian Production

Canadian woodpulp production in March totalled 852,792 tons, off from the 922,131 tons produced in March last year. Output in the first quarter was also off at 2,358,596 tons as compared with 2,638,761 tons in 1957.

Production in the first three months this year included 1,054,254 tons of chemical pulps and 1,287,786 tons of mechanical pulp. Chemical grades output for the same period in 1957 was 1,192,286 tons while mechanical production was 1,425,317 tons.

Pulp exports in March were 175,694 tons as against 195,319 tons last year. Exports to the end of March totalled 456,693 tons this year and 560,041 tons in 1957.

Domestic pulp consumption in March was 652,358 tons bringing the total for the quarter to 1,863,414 tons. In 1957, Canadian consumption for the month was 706,194 tons and for the quarter was 2,029,869 tons.

Paperboard

Canadian paperboard output in the first quarter totalled 185,736 tons as against 210,503 tons last year. Included in this year's total were 91,189 tons of container grades, off from 111,901 tons last year, and 94,547 tons of boxboard grades as against 98,602 tons in 1957.

Paperboard exports to the end of March were 14,223 tons this year as compared with 20,434 tons a year ago. Domestic consumption for the period was 168,144 tons this year as against 179,918 tons in 1957.

Wrapping Paper

Canadian wrapping paper output including bag and other converting papers, totalled 66,207 tons in the first three months this year as against 64,695 tons in 1957, and 72,097 tons in 1956. Exports for the period were 5,373 tons this year, 3,159 tons in 1957, and 3,987 tons in 1956.

Some 60,173 tons of wrapping paper were used in Canada to the end of March this year. Domestic use for the same period last year was 59,452 tons and in 1956 was 66,626 tons.

Strike at Philip Carey Mill

A strike of the United Papermakers and Paper Workers closed down the Philip Carey Co. mill at Lockland, Ohio, last week. This plant produces 200 tons per day of building type papers. The strike was called after union and management contract negotiations broke down.

Columbia Scholarship Finalists Chosen

Four students have been announced as eligible for the annual scholarship award made by the Columbia Box Board Mills Foundation. Those chosen were William R. Bonneau and Arthur H. Kelley of Ockawamick Central School together with Edwin J. Ranzoni and James A. Miller of Chatham Central School, Chatham, N. Y.

The four students selected were taken to the University of Maine the first weekend in May for the Open House sponsored by the University of Maine Pulp & Paper Foundation. While at the University they were interviewed by university personnel to further determine which one will be the eventual winner of the scholarship. An alternate will also be chosen. The announcement of the winner will be made May 15.

The scholarship grants a total of $3000 assistance for four years at the University of Maine in the study of paper and pulp technology.

Another Proposed Alberta Mill

Engineering plans are reported to be completed for the construction of a new $25 million pulp and paper mill in Alberta, Canada. The company is Alberta West Forest Products which has a forest management license adjoining that of North Western Pulp and Power Co.

Chief output of the mill, it is said, will be newsprint (!) and will involve chemical and groundwood pulp mills.

So far as we can ascertain no financing arrangements have yet been made for the mill.

Paper and Board Production

According to the American Paper and Pulp Assn., the ratio of the United States production to mill capacity for the week ending April 26, 1958, was 89.0 per cent compared with 86.5 per cent revised for the preceding week. The ratio was 88.6 per cent for the corresponding week a year ago.

The paperboard production ratio for the week ending April 26, 1958, was 81 per cent compared with 87 per cent for the preceding week and 86 per cent for the corresponding week last year.

(Detailed statistics on page 54.)

Committees Named by Folding Box Assn.

J. N. Andrews, newly elected president of the Folding Paper Box Assn. of America, has announced the 1958-59 committee appointments for the association.

The members appointed will fill positions on eight separate association committees, according to Mr. Andrews, who also is executive vice president of the Ohio Boxboard Co., Rittman, Ohio.

The new committee selections include the following members:

Accounting—Donald Boylan, chairman; R. W. Anderson, Kenneth Dutcher, R. G. Paramore, R. M. Thornberry, W. H. Walters, executive member.

Bakery Package—Harold E. Pierce, chairman; Jay C. Bruce, Wray Callaghan, James E. Phillips, Paul Van Keuren, Arthur N. Morris, executive members.

Industrial Relations—Robert Menshausen, chairman; George Alford, Samuel Angotti, Carl Geisler, George Greenwood, Bayle M. Richardson, executive member.

Public Relations—Herbert C. Bernard, chairman; A. W. Buchanan, William H. Caddoo, Gordon Dilno, J. Sanford Doughty, John Madden, Howard C. Minnich, W. J. Alford III, executive member.

Statistics—Robert C. Neff, chairman; Edward Gereke, W. Leonard Johnston, Leo H. Schoenhofen, A. H. Wilhelm, Norman F. Greenway, executive member.

Stock Box—Clark O. Bennett, James Foley, C. D. Hamilton, K. A. Peterson.

Technical and Production—D. A. Forsberg, chairman; E. R. Brooks, Edward Geckle, John Redpath, Arthur Rous, George Russell, William B. Leavens Jr., executive member.

Traffic—Claude L. Fenstermaker, chairman; Jules W. Deininger, Edward T. Hayes, Harry D. Johnson, Robert H. Lorenz, Joseph A. Quinlan, Paul Thorne, E. A. Weathers.

Eastern Corp. Mill Starts Up

The new continuous bleached kraft pulp mill of Eastern Corp. at Lincoln, Maine, is due to begin trial operation in mid-May. As soon as operations have settled down, *Paper Trade Journal* will present a detailed article on this plant, the first built on this continent to produce bleached kraft pulp from hardwoods by a continuous process.

The new mill adjoins an existing bleached hardwood sulphite pulp mill and a two-machine fine paper mill.

PAPER PEOPLE

E. M. Little

W. E. Soles

Anglo-Canadian Changes Top Officers

At a directors' meeting held in Quebec City recently Anglo-Canadian Pulp and Paper Mills Ltd.'s president, E. M. Little, was at his request elected chairman of the board. He had been president since 1945.

Mr. Little was succeeded as president by W. E. Soles, who was elected president and general manager. Mr. Soles has served the company in various capacities since 1935. He became general manager in 1952 and had been vice president and general manager since 1954.

Leonard A. Murphy

GNP Mill Head Transferred for Training

James McLean, superintendent of the Millinocket mill of Great Northern Paper Co., has been transferred to the East Millinocket mill in a temporary training measure.

He is transferred on a temporary status for about two months of training in observing processes of that mill.

Replacing Mr. McLean at Millinocket during the training period will be foreman Charles Durkee.

Powell's Plant Engineer

Ten years after he was selected for Powell River Co.'s undergraduate development program, Leonard A. Murphy has been appointed plant engineer at Powell River, succeeding the late Gilbert D'Aoust.

Mr. Murphy joined Powell River Co.'s engineering staff in 1951 after working the three preceding summers in the West Coast pulp and paper mill as a University of B. C. engineering student.

He became industrial engineer in 1954 and was project engineer on Powell's No. 16 boiler last year.

New Duties at Allied for Maremont

Appointment of Michael D. Maremont as administrative assistant to George A. Littlefield, executive vice president, is announced by the Allied Paper Corp.

Mr. Maremont will continue his function as head of sales administration but he will also have the responsibility to get faster dissemination of sales information to management and other departments throughout the corporation.

Riegel Appointments at Carolina Mill

Riegel Paper Corp. has announced the appointment of Joe Callan, finishing and shipping supervisor, and William Brown, shift foreman at its new Carolina Paper Mill in Acme, N. C.

Mr. Callan has joined Riegel from Potlatch Forests, Inc. where he was assistant superintendent in finishing and shipping. Mr. Brown was tour foreman at Potlatch prior to joining Riegel. According to Riegel, their new paper machine at Acme will be starting production during May as originally planned.

David Coffin Succeeds Father As Dexter Pres.

Dexter D. Coffin, has assumed the post of chairman of the board of C. H. Dexter & Sons Inc., Windsor Locks, Conn. He is succeeded as president of the company by his son, David L. Coffin, who represents the seventh generation of his family to manage the firm which was founded in 1767.

Dexter Coffin has served as president since 1936. David Coffin joined the firm in 1947, became assistant sales manager in 1949, vice president in 1951 and general manager in 1955.

Dexter D. Coffin

David L. Coffin

E. Gilbert Mathews

Federal Paper Board Names Vice President

Federal Paper Board Co. has named E. Gilbert Mathews vice president in charge of carton production. He will have responsibility for the company's eight carton plants which are located in the East and Midwest.

Mr. Mathews has been in charge of carton production for Federal since October 1957. Prior to that time he was resident manager of the company's New Haven, Conn. carton plant.

In 1938, Mr. Mathews joined the production staff of National Folding Box Co. where he served in numerous supervisory and administrative capacities culminating in his appointment as general superintendent for National, which was acquired by Federal Paper Board in 1953.

J. W. Wing

Dryden Elects General Manager

Dryden Paper Co. Ltd. has elected J. W. Wing vice president and general manager. He has been general manager and a director of the company since May 1957. He has served the Anglo group in various capacities since 1936 and was vice president and general manager of Gaspesia Sulphite Co. Ltd. before joining the Dryden.

William R. Winters

New Vice Pres. of O-I Mill Div.

William R. Winters, who began his career with Owens-Illinois Glass Co., on the selecting line of the company's glass container plant at Clarion, Pa., has been appointed vice president of the O-I Mill Division and manager of scheduling and purchases.

Mr. Winters will coordinate the placement of orders between the company's five paper mills and outside suppliers, as well as schedule the production at the five mills.

Mr. Winters joined Owens-Illinois in 1940. From the selecting line of the Clarion plant he moved to a decorating machine, and then into purchasing and stores before transferring to the company's general offices in Toledo, Ohio. In Toledo he was buyer for corrugating material from 1948 until January of this year when he became manager of production planning for the Mill Division.

Changes Announced by Marathon

Jack L. Staniak, manager of the Menasha plant, has been named assistant to the director of manufacturing services of the Marathon division of American Can Co. He will be succeeded as manager by Don C. Rawson, who has been manager of Marathon's Oswego, N. Y., plant since 1951.

Mr. Staniak joined the old Menasha Paper Co. as third hand on a paper machine in April of 1909. His entire working career has been with Marathon at Menasha.

Mr. Rawson began his Marathon career in the maintenance department of Menasha Products company in 1933.

Ronald A. Westgate, manager of Marathon's Newnan, Ga., plant since operations started in 1956, succeeds Mr. Rawson at Oswego. Ragnar L. Freeburg, Jr., production superintendent at the Wausau plant becomes plant manager at Newnan.

W. A. Kirkpatrick

Leaves Allied Paper Corp.

W. A. Kirkpatrick, vice president for research and development of the Allied Paper Corp., left the company April 30. Mr. Kirkpatrick joined the staff of the Allied Paper Mills in 1936 after a period of four years with the S. D. Warren Co. of Cumberland Mills, Maine. Allied Paper Mills, predecessor to the present firm, made him technical director in 1937 and promoted him to vice president in 1949. He was in charge of research and development, mill control, and sales service.

When the Thor Corp. purchased Allied Paper Mills in 1955, Mr. Kirkpatrick was made vice president and a member of the four-man management team.

He is an Honorary Secretary of the Massachusetts Institute of Technology and was a co-founder of the WMU School of Paper Technology. He has announced no immediate plans for the future, but indicates he may do some consulting.

Ferrelli Promoted at Westvaco Covington

Mark A. Ferrelli has been promoted administrative assistant to the superintendent at the Covington, Va., plant of the West Virginia Pulp & Paper Co.

Mr. Ferrelli has been employed as analyst in the paper mill's market research group since he joined the company in Covington in July 1957.

Riegel Transfers Hoffman

Riegel Paper Corp. has transferred Jerry W. Hoffman to the New York office as sales engineer. He will cover merchant and industrial paper customers and report to A. J. Ericsson, product manager.

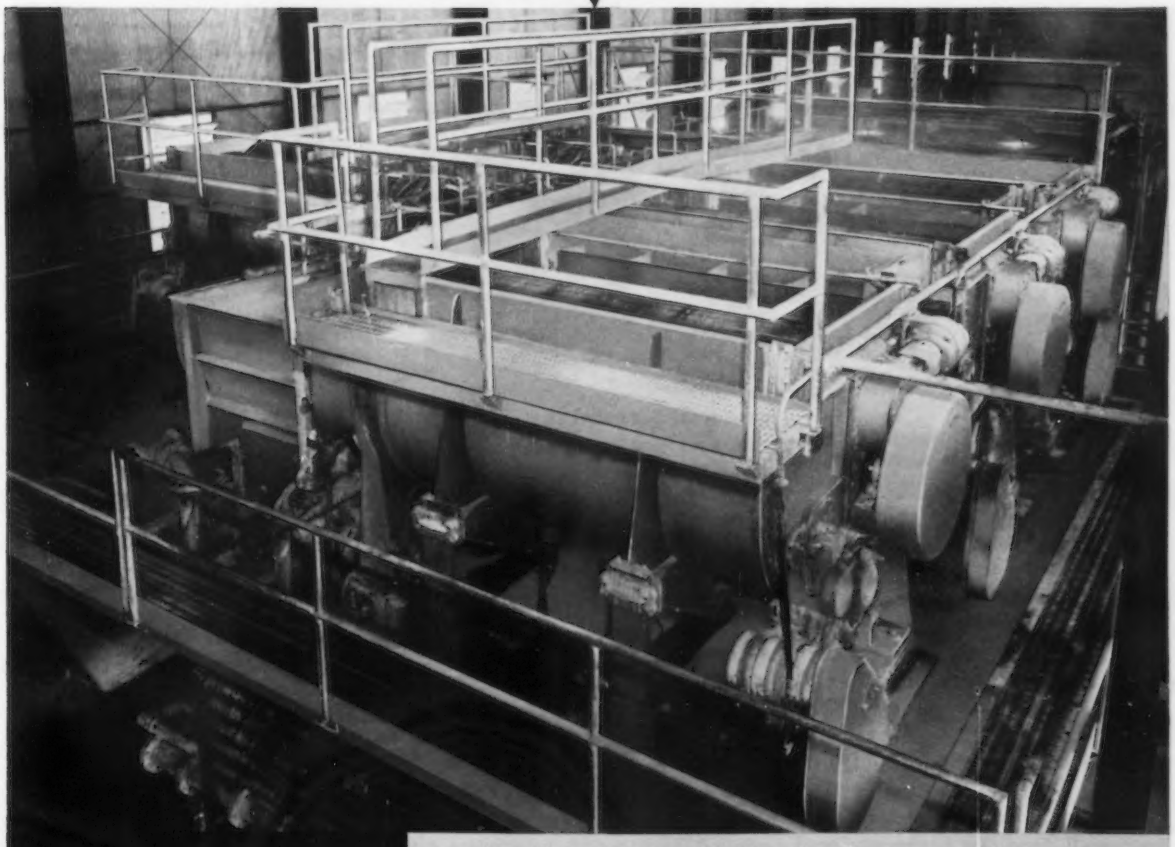
Mr. Hoffman was formerly in the technical department of Riegel's New Jersey division.

BIRD SCREENS

belong at the head of the paper machine ...to head off rejects and shutdowns

These Screens are delivering stock to a big, new paper machine — stock that is *Bird Screen clean* — stock that is uniform in weight, free of lumps, strings and slime — stock with the fibres nicely combed out and individualized to assure good formation — stock that contains nothing that can do damage to delicate machine wires or scratch polished roll surfaces.

To meet today's exacting standards of paper cleanness and uniformity, big, modern Bird Screens belong at the head of *your* paper machine.



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NEWS OF CONVERTERS

Benson to Manage Container Corp. Plants

Thomas L. Benson Jr., has been appointed general manager of Container Corporation of America's folding carton plants at Chattanooga, Tenn., and Greensboro, N. C., Leo H. Schoenhofen, senior vice president, has announced. He was formerly general manager of the Greensboro plant. His new duties follow incorporation of the Chattanooga unit into the company's Eastern Boxboard and Carton Division.

Transo Envelope Sets Up Western Div.

Transo Envelope Co., Chicago, has established its western divisional headquarters in Glendale, Calif., at 600 Paula St., in the Grand Central Industrial Center. Transo formerly had a sales branch in the same area at 6545 Westlake Blvd., Los Angeles.

A new Transo production facility has also been opened in Los Angeles under the direction of M. B. Stevenson, manager, Western Division. Arvey Corp., Chicago, is the parent company.

Moore Business Forms Promotions

Two supervisory promotions were announced by Moore Business Forms Inc., Niagara Falls, N. Y.

Donald M. Hart has been named superintendent of the Register-Continuous Division of the Buffalo Ave.

Lloyd W. Lashway, the present superintendent, will move up to personnel manager of the Highland Ave. plant, effective June 1. Mr. Lashway will fill the post left vacant by the death of Charles B. Stott.

Spitzer Box Appointments

Spitzer Paper Box Co., Toledo, Ohio, announces the following appointments: Emerson B. Messinger has become head of the production control; Art Lee, formerly with Consolidated Paper Co., was named a box designer and salesman; and Homer Mack was named to represent Spitzer in the Detroit area.

Rochester Interests Buy Labelon Tape

E. B. Brewster, president of Labelon Tape Co., Rochester, N. Y., has announced purchase by Rochester interests of the Sani-Thread Co. of Buffalo, pioneer manufacturer of disposable paper slippers.

Manufacturing equipment will be moved to the Labelon plant for production of the slippers.

Mr. Brewster said the purchase is a step in long-range expansion plans. In addition to Labelon he has interests in the Rochester Ribbon & Carbon Co., American Ribbon Carbon Co. and Brewster Enterprises Inc.

Curtis 1000 Names Whitman VP, Director

Curtis 1000, Inc. has elected Harlan M. Whitman vice president and a director of the corporation. He will continue to reside in Minneapolis, Minn., where the company's original plant is located. The company also has a plant in Hartford, Conn.

Mr. Whitman has been associated with Curtis 1000 since 1934 and in 1936 was appointed advertising manager. He assumed the dual responsibility of advertising and sales promotion manager in 1939 and became assistant general sales manager in 1953. He was appointed general sales manager for the entire company in 1955.

Managers Appointed by U.S. Envelope

Three management appointments at United States Envelope Co. have been announced:

Elbridge H. Greene Jr. was appointed to the new position of manager of the chain variety store sales department of the Kellogg Envelope Division.

Bruce S. Crawford of Wilbraham was appointed to a similar managerial position in charge of the greeting card sales department of the Kellogg Envelope Division.

Richard C. Brown was appointed assistant director of the USE laboratory at Metuchen, N. J.

Endura Producing Latex-Impregnated Product

A specialty line of rubber latex impregnated paper products for pressure sensitive printing and industrial tapes currently is being produced by Endura Corp., Quakertown, Pa.

A number of the compounds used by Endura for paper saturation are based on Chemigum and Pliolite latices supplied by the Chemical Division of Goodyear Tire & Rubber Co. In addition to latex, a typical impregnating solution contains pigment, antioxidant, reinforcing agent, stabilizer, thickener and perhaps antifoam and curing agents.

Chemigum latex, noted for its exceptional oil resistance, furnishes toughness, tear resistance, flexibility and good light-aging properties. In addition, it provides internal bonding that prevents tape from splitting as it is unwound from the roll.

Pliolite latex serves as a reinforcing resin and furnishes required tensile strength and modulus. At the same time, the Goodyear product makes the paper easier to handle by reducing elongation and helping to decrease tack.

Both latices have mechanical stability, an important feature, since excess latex is squeezed from the paper and circulated for reuse. Chemigum and Pliolite latex exhibit good compatibility with a wide range of materials used in saturating compound formulations. They also furnish good penetration, thus assuring uniform quality throughout the paper.

In production of impregnated paper, stock is fed from huge rolls through a saturating bath containing the latex compound. The bath is supplied by gravity feed from storage tanks located on a mezzanine above the saturating unit. As the paper leaves the bath, it passes between squeeze rolls for removal of excess compound.

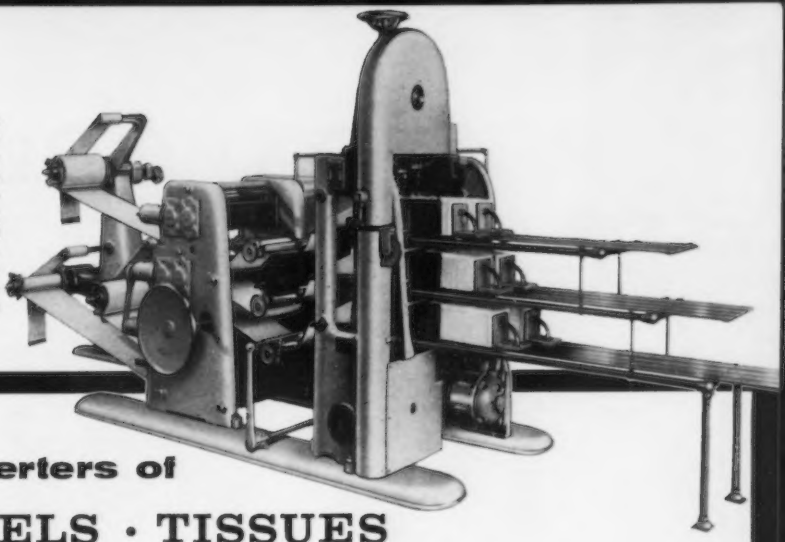
Paper is dried in hot-air circulating ovens in which temperature and humidity are under exacting control. Following the drying operations, paper sometimes is festooned to permit gradual cooling and complete drying before wind-up to make possible removal of completed rolls without interrupting continuous production.

Some latex compounds contain curing agents to impart additional strength and delamination resistance. Paper treated in this manner is cured in the final stages of the drying oven.

In addition to papers for pressure sensitive printing and industrial tape applications, Endura also produces papers for such varied products as gaskets, leather-like covers, artificial flowers, labels and posters.

A NAPKIN FOLDER WITH TRIPLE EMBOSSER

Pacemaker for the industry, this machine produces regular or facial quality napkins (and other paper or cellulose products) of all standard sizes in perfectly folded squares. Rotary in operation, it handles one to four parent rolls simultaneously and produces up to 2400 completed printed and embossed napkins per minute! Multi-color oil or flexographic ink printing and embossing units can be furnished or added as required. Heavy duty construction, high production speed, dependability, low original cost plus low maintenance expense makes this machine the most popular napkin producer in the industry.



Leading converters of

NAPKINS · TOWELS · TISSUES

rely on these

HUDSON-SHARP "workhorses"

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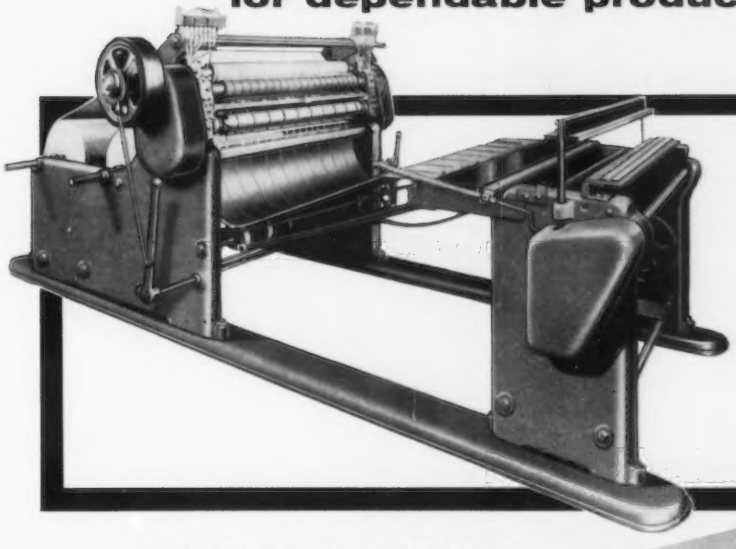
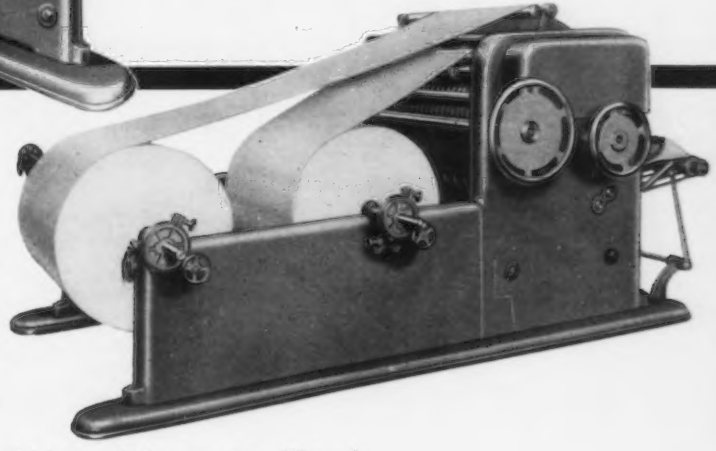


ROTARY TISSUE INTERFOLDER

Production of single or double-ply interfolded toilet tissues in single or multiple folds reaches unprecedented new highs with this modern Hudson Sharp machine. Sturdily constructed and completely rotary in operation it carries paper from parent rolls through feed rolls, into folding cylinders, and continuously delivers a product of exact sheet count to the packaging unit. Equipped with a semi-automatic banding unit, one operator easily handles the machine's entire output. Embossing units can be added if desired.

ROTARY TOWEL AND WAX INTERFOLDER

Designed to produce interfolded towels in any standard size, this machine produces from 10 to 12 cases, per towel width, per hour! Completely rotary in operation, all necessary adjustments are simple to make and easily accessible. Furnished in any widths up to 60" in all standard sizes and folds. Besides towels, this machine is practically adaptable for interfolding wax papers, glassines, butcher wraps, delicatessen papers and others. Write for complete information on any of these popular Hudson Sharp machines that are continuously increasing converting production throughout the industry.



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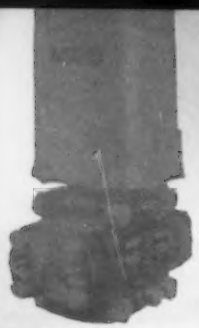

Simplest installation — orifice flange tap connections at standard spacing, are provided at both ends.

Drain and vent holes at lowest and highest points on both sides.

Purged cover protects transmitter from weather, dust, and fumes.

Over 60,000 now in use!

No zero drift . . . positive overrange protection . . . high sustained accuracy even under the most punishing operating conditions. No wonder over 60,000 Foxboro d/p Cell Transmitters have been installed since they were introduced in 1948.

By introducing the modern concept of high speed flow measurement and control, these differential pressure transmitters have *revolutionized* many an industrial process. Bulletin 13-11A shows how — and portrays the benefits the d/p Cell Transmitter offers you. Write The Foxboro Company, 235 Norfolk St., Foxboro, Mass., U.S.A.

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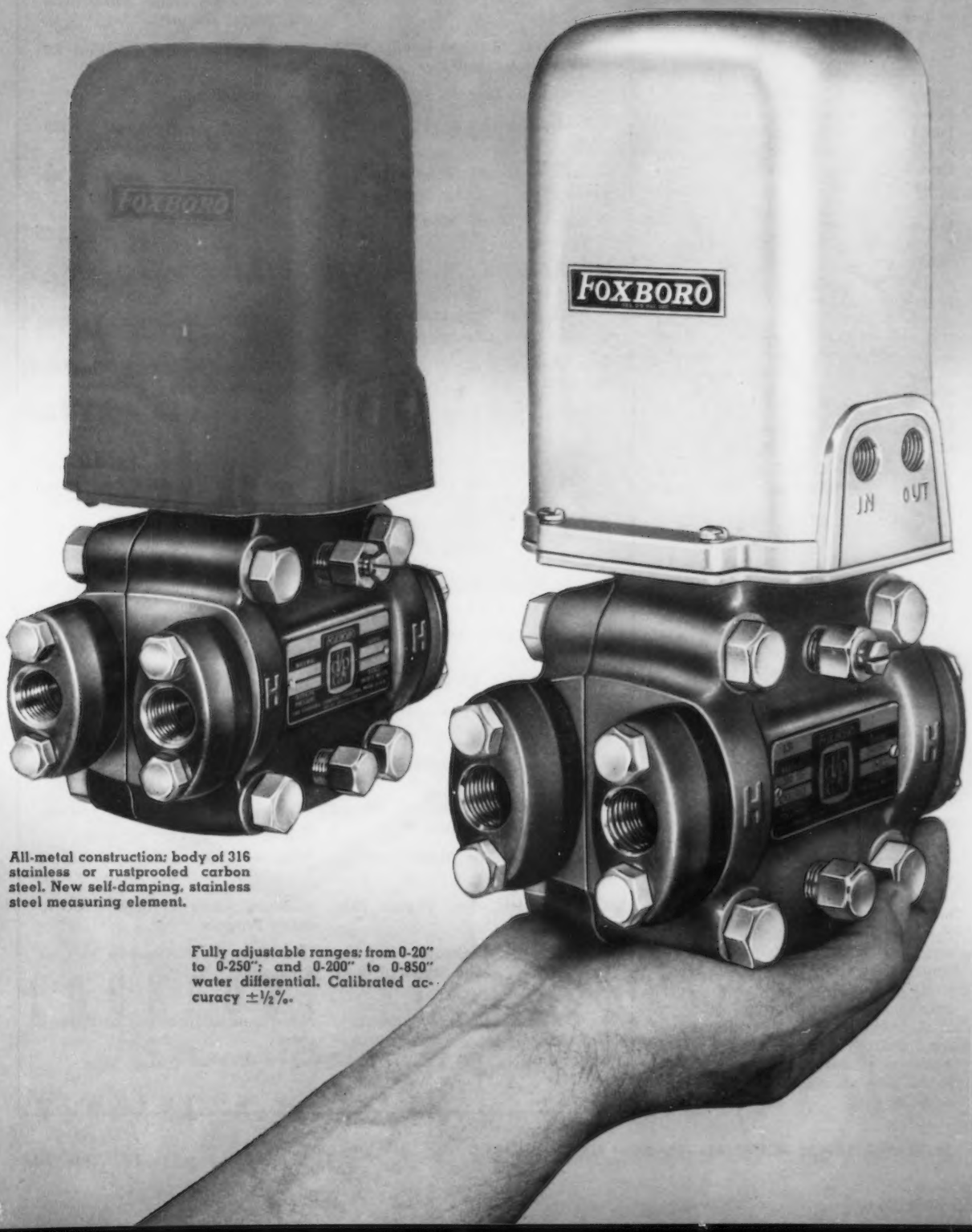
FIRST in Flow Measurement and Control

FLOW TRANSMITTERS...

in accuracy, stability and performance



All-metal construction: body of 316 stainless or rustproofed carbon steel. New self-damping, stainless steel measuring element.

Fully adjustable ranges: from 0-20" to 0-250"; and 0-200" to 0-850" water differential. Calibrated accuracy ±½%.

Industry Urged to Campaign To Publicize Corrugated

A proposal to put the full weight of the corrugated shipping container industry behind a campaign to clear the word corrugated from confusion with other paper products is made by Samuel M. Langston Co. in a current advertising and direct mail program.

The Camden, N. J., company has for more than a half-century been a maker of corrugated container machinery, but itself does not make corrugated board.

Pointing out that the industry often laments that its chief product is repeatedly confused with such names as pasteboard and cardboard and further clouded by the name fiberboard, Langston suggests a comprehensive advertising, publicity and public relations program to call corrugated by its rightful name of corrugated.

A complete outline of procedure is contained in the April issue of the company's "Langston Leader", a four-page direct mail and trade magazine advertisement. The Langston Leader is mailed to 1200 top executives in the corrugated shipping industry. It also is inserted monthly in Fibre Containers magazine.

Bryant W. Langston, president of the firm, points out that even in the container industry, men who are 95 per cent dependent on corrugated will talk about fiberboard or fiber box when they mean corrugated.

"If this confusion exists in our own shop talk," he asks, "how can we expect the public not to mix up corrugated with fiberboard, pasteboard or cardboard?"

Other public relations opportunities, such as movies, television, press conferences and plant visit programs, are among the Langston proposals.

Langston said corrugated is a leader in packaging because, among other things, it is light, strong, resilient, of relatively low cost, lends itself easily to design and printed message and to automatic devices.

The plan would require the full support of every manufacturer and converter of corrugated, but Langston is certain such a program would not only give proper prestige and personality to the product, but would also develop millions of dollars in new business.

To carry out the program, Langston suggests everyone in the corrugated container business agree on an advertising and publicity campaign, accept individual company responsibility on local levels and delegate authority to the industry's association (Fibre Box Association) to hire the best possible public relations counsel in the country to do the job.

Superintendents Convention to Feature Cost Reduction

The annual convention of the Superintendents Association will be held at the Hotel Statler in Boston on June 3-5. The theme of the meeting will be cost reduction and the majority of the papers on the program listed below are devoted to this subject:

Robert E. O'Connor, Secretary, A.P.P.A.	Cost Reduction Trends Affect Economy of the Industry
H. M. Gray, Sealright-Oswego Falls Corporation.	The Imperative Need For Cost Reduction
D. J. Dughie, Scott Paper Company.	Painless Cost Reduction
J. J. Ward, Union Bag-Camp Paper Corp.	A Practical Approach to Maintenance Cost Reduction
Thomas E. Hoover, Kimberly Clark Corp.	Foreman Education for Cost Reduction
D. Crossley, North Western Pulp & Power Ltd.	Modern Forestry Management
B. P. Bunch and C. D. Coates, The Mead Corp.	Control of Pitch in Sulphite Pulp
Dr. Nicholas J. Lardieri, National Council for Stream Improvement.	Air Pollution Control and Its Relation to our Industry
E. N. Wennberg, Weyerhaeuser Timber Co.	Cost in the Production of Bleached Fourdrinier Boards
Jack Wilber, St. Regis Paper Co.	Paper and Board Coating—On or Off—Machine
R. E. Phinney, Container Corp.; Garland T. Edmonds, Chesapeake Corp.; Anthony J. Parrino, Rome Kraft Co.; Richard Smith, Beloit Iron Works; Wesley Corbin, Black-Clawson Co.	Comparative Analysis of Steam Consumption on High Speed Fourdrinier Machines (A Panel)
Carl H. Swartz, Beloit Iron Works.	Developments and Applications of the Suction Former
William Huggins, Detectron Inc.	Instrumentation for Cost Reduction and Quality Control
Robert Hisey, S. D. Warren Co.	Refining of Hardwood Pulp
Cecil C. Parvin, Nekoosa-Edwards Paper Co.	Cost Reduction in the Finishing Room
R. Carl Chandler, Standard Packaging Corp.	Cost Reduction's Greatest Aid is a Well-Planned Sales Program
Garland T. Edmonds, The Chesapeake Corp. of Virginia.	Evaluation of a Hot Press Installation
H. A. Black, The Mead Corporation.	What are Pulp and Paper People Thinking
Ralph V. Metz, West Virginia Pulp & Paper Co.	Reducing Costs Through Effective Safety Program
Clarence B. Nickerson, Harvard University, Graduate School of Business Administration.	Cost Control—Prerequisite to Cost Reduction
Alva Kindall, Harvard University, Graduate School of Business Administration.	Non-Financial Incentives of Productivity

Dura-Loft Production

Zooms!

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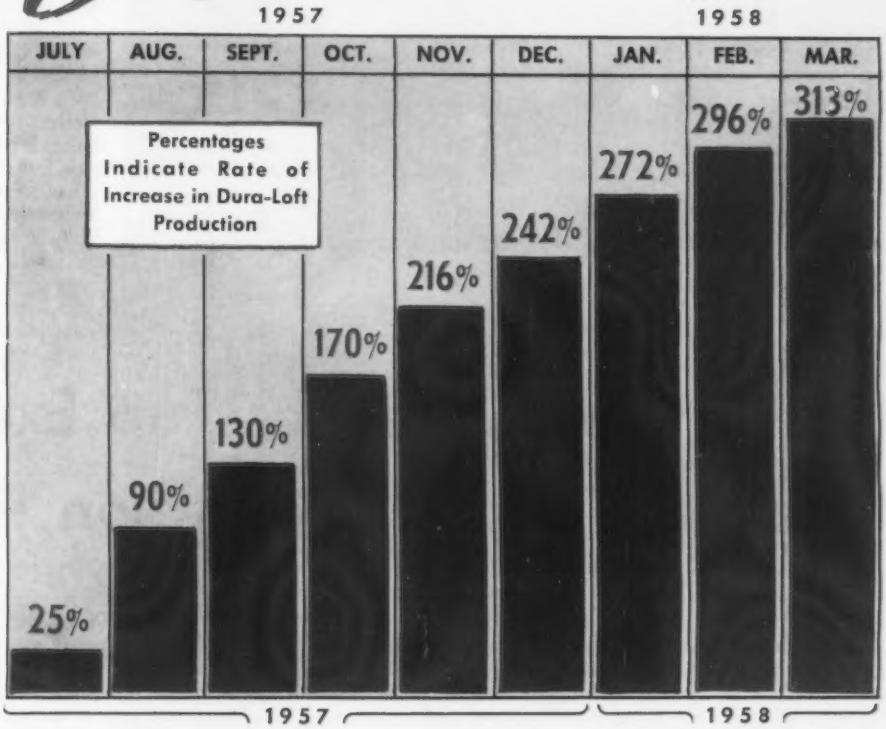

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NEWFANE, N.Y. STARKVILLE, MISS.

FOUNDATION DIRECTORS WHO MET — (rear) George Olmstead Jr., S. D. Warren Co.; P. S. Bolton, Continental Can Co.; A. G. Durgin, University of Maine; D. D. Uong, Fitchburg Paper Co.; Prof. Lyle C. Jenness, University of Maine. (Front) H. W. Fales, St. Croix Paper; M. C. McDonold, Great Northern Paper Co.; J. L. Ober, Foundation president; F. A. Soderburg, F. C. Huyck & Sons; and R. A. Wilkins, Bird & Son.

Industry and Supplier Top Executives Meet to Consider Education Problems

Annual Open House and Research Days were held at Orono, Maine on May 2 and 3 by the University of Maine and its Pulp and Paper Foundation. The program opened with laboratory demonstrations of 19 research projects being carried on in the pulp and paper field at the university. After a luncheon a meeting was held at which all the students in the fourth and fifth years of the pulp and paper course were presented. This was followed by a questionnaire and answer program.

The questions asked by the students were answered by the following panel: A. F. Armstrong, director of industrial relations, Scott; W. F. Daniell, manager of engineering and research, Great Northern, Wayne G. Davis, vice president, Albany Felt Co.; Angus J. Gardener, vice president, Rice Barton; F. C. Goodwell, research manager St. Regis Bucksport Mill; H. L. Mellon, P. M. C. district, Hercules; H. C. Moore, president, Beloit Iron Works; George Olmstead Jr., president, S. D. Warren; T. F. Spear, vice president, Oxford; and R. F. Vokes, vice president, Black-Clawson Co.

A dinner meeting under the leadership of J. L. Ober, retired Scott vice president, was held at the Penobscot Valley Country Club. The principal speaker was W. L. Moise, vice president, Blyth & Co., investment bankers of New York. Mr. Moise's remarks were of such interest that we are printing them in full.

← COATING MACHINE is tried out on one of the coating research projects.

Laboratory Demonstrations of Research Problems

Dryer Roller Bearing Lubrication (Sponsored by The Texas Co.)

The performance of lubricating oils for paper machine dryer roller bearings is being evaluated on two testing machines. Designed to simulate dryer bearing operation, these machines can operate under variable conditions of load, speed, oil supply rate, shaft heat input and moisture addition. Accelerated tests are carried out on small (Size 09) spherical roller bearings.

Reproducibility of Results with the I.T. Printability Tester. (Made possible by a grant-in-aid from Hercules Powder Co.)

The effect of combinations of three different variables, on the reproducibility of pick testing results was investigated. The results were obtained by recording the first evidence of picking on the test sample and then converting the distance from the start of the testing strip to the point where picking occurred to printing speed in feet per minute. The three variables investigated were: (1) cylinder backing, (2) printing pressure and (3) ink tackiness.

Three samples of base stock were used. The first sample was known to have a high resistance to picking, the second a medium resistance, while the third was known to have a low pick resistance.

Effect of Fiber Length on Tensile of Handsheets.

Fiber fractions of a bleached sulphite pulp were obtained using the Bauer-McNett classifier. The average fiber lengths of each fraction were obtained by microscopic measurement. Various mixtures of the several fractions were made. Handsheets made of these mixtures were tested for various strength properties.

Effect of Static Pressure on Pipe Friction of Flowing Stock.

A technical analysis of flowing pulp stock has been progressing at the University for a number of years. Various phases have been isolated and studied, each contributing an understanding and a basis for further investigation. This study is endeavoring to present the correlation between static head and friction head loss. Indications are that a minimum value for friction head loss is reached as the static head increases.

Development of a Butadiene-Styrene Latex for Use in Coating (Sponsored by Dewey & Almy Chemical Co.).

Recent developments in the paper coating field have pointed out the desirability of using synthetic lattices as part of the adhesive in paper coating colors. Improved printability, gloss, and fold are among the variables enhanced by the use of a synthetic latex.

The purpose of this work was to develop a copolymer of butadiene and styrene which would improve the above mentioned variables and in addition would have the rheological characteristics which would make it suitable for high solids coating colors.

Standard colors were prepared and different formulations of butadiene-styrene copolymer were substituted for portions of the starch adhesive. These colors were then run on the reverse roll coater. The results were evaluated in terms of smoothness, printability, glass, foldability, and flow properties of the coating color.

PULPING STUDY—This group was interested in An Investigation of Neutral Sulphite Semi-Chemical Pulping of Eucalyptus Saligna. Left to right, H. J. Peddicord, H. Lewis, T. W. Anderson, C. A. Wynn, William Doane, F. DeAlmeida-Neto, R. F. Vokes.

PIPE FRICTION—Donald Mavor, left, a student at the University, describes an Investigation of the Effect of Static Pressure on the Pipe Friction of Flowing Pulp Stock. Observing are R. F. Murphy, W. A. Ketchen, C. T. Bockus.

Use of Urea-Formaldehyde to Waterproof Starch-Clay Coating (Sponsored by Allied Chemical & Dye Corp.).

A urea-formaldehyde concentrate has been used to improve the wet rub resistance of starch-clay coated paper. The product (U F Concentrate 85) contains approximately 59 wt % formaldehyde, 26 wt % urea, and 15 wt % water.

Standard coating formulations in the 68% solids range were made up and U F 85 substituted for the starch on a 15 wt %, 25 wt %, and 35 wt % basis. The colors were run on a reverse roll coater at 500 fpm at pH values of 6, 7, and 9.

The results indicate that considerable wet rub resistance is imparted to the coating at all pH values used but that the best results are obtained when using acidic pH values. IGT printability tests indicate no significant change in printability with changing pH.

In addition, the time required to develop the wet rub resistance has been investigated. Preliminary results indicate that the cure is substantially complete when the coating has been dried on the coating machine.

Investigation of NSSC Pulping of Eucalyptus.

By means of a series of cooks an attempt will be made to produce a satisfactory pulp by evaluating the effects of the following variables:

1—Time (impregnation)
2—Chemical to wood ratio
3—Liquor to wood ratio
4—Ratio of active chemical to buffer

Following the investigation of the above variables, a comparison will be

(Continued on page 60)

Some Investment Aspects of the Paper Industry TODAY

W. L. Moise
Blyth & Co.

Just two years ago at Blyth & Co. we published for general distribution a 20-page report entitled "Investment Aspects of the Paper Industry" covering "pulp-paper-paperboard and their converted end products." Its conclusions were confident and optimistic as regards the future of the industry and the ideas expressed are generally valid today.

For these few remarks, I have assumed the privilege of modifying that subject to read "*Some* Investment Aspects of the Paper Industry, *Today*."

There may be people in Wall Street who still gaze into crystal balls to read the future. In our firm we prefer a clearer insight into what is really going on in an industry or a company. As investment bankers, we do not attempt economic forecasting. Our business is to assist industry in raising capital and marketing securities when those services are needed. Imagine how long we would be in business if a paper company asked us to raise new equity capital and we had to refuse the business because our economists didn't like the current outlook for paper stocks. That company would soon get another firm to handle its business. Our endeavor in underwriting securities offerings is to have them priced fairly in relation to the prevailing market for other issues of similar background and character.

Paper Stocks Favored

Right now the market accords paper stock a rather favorable appraisal and appears to be saying that perhaps things are not as dark as they may seem. Our annual tabulation of significant "Paper Industry Financial Ratios" shows that while average earnings per share of paper stocks declined 17 per cent last year, average market prices of the stocks are off only 10 per cent—despite the fact that first quarter indications are for further sizeable declines. By comparison, profits of steel companies were up 4 per cent but their stocks are down 21 per cent; oil earnings were up 2 per cent while their stock prices are down 14 per cent; chemicals earned 2 per cent less but chemical stocks are off 20 per cent. So, those unseen people who make the market—supply and demand, that is—have confidence in a good recovery for the paper business in reasonable time. Copies of the new tabulation were mailed this week and we would be glad to send copies to any of you who cares to write us.

The April issue of the Economic Bulletin of the First National City Bank of New York says, "For comparing earnings in all lines of business the only common denominator is return on capital." You will find our ratios based on that assumption.

We have a healthy respect for the ratio of net income to book value and cash flow to book, also for the relationships of net income and cash flow to market prices. In its April economic letter the First National City Bank of New York shows that the return earned on net worth for 67 leading companies in paper and allied products declined from 14 per cent in 1956 to 11 per cent in 1957 while return on net worth for 69 chemicals declined from 15 per cent to 14 per cent and the same ratios for all manufacturing declined from 14 per cent to 13 per cent. In the vital matter of profits earned on net worth, the paper industry lost some of its strong position.

NEW EXPERIMENTAL paper machine made possible by a donation from Hugh J. Chisolm, chairman of board, Oxford Paper Co.

Paper Outlook

You can take some satisfaction from the fact that the paper industry is presently operating at a better capacity ratio than steel, copper, aluminum or petroleum. The Econometric Institute has recently published its paper industry digest anticipating a slow improvement in demand for most paper lines in the second half of this year with fairly strong recovery in the first quarter of 1959. Their projections, based on confidential reports of incoming new orders from many industries, has been rather dependable in the past. The Institute serves many paper companies and trade associations of the industry.

I am somewhat aware of that long term upward trend in per capita consumption of paper and paperboard products. Also, that the population of the country is rising at three million a year compared with only 1.3 million 25 years ago. These facts, and such studies as the Stanford Report of 1954, Department of Commerce Report of 1957 and a new forecast by Stanford just out (see *Paper Trade Journal*, April 28, 1958, page 20), are all quite convincing that paper is the best of all possible industries.

Over-expansion

But there are some things that I am worried about. This very conception that constantly rising consumption of paper products is inevitable has already led to some excesses of building new capacity. With the apparent certainty now that the country as a whole has ample wood supplies for the foreseeable future, it seems that every converter of paper and paperboard and every owner of timberlands want to own pulp mills. We all know of many such plans by converters and timberland owners, some still secret and some not so secret. With money again becoming easily available, I anticipate that a number of these plans will become realities—perhaps before there is a full market for the present excess capacity. These feelings, which are shared by others, were expressed by Robert M. Fowler, permanent president of the Canadian Pulp and Paper Association, who said recently to a group of papermakers "I doubt if any one in this room will live to see a return, except for brief intervals, of full capacity operations of the past decade. A gap between capacity and demand will be normal."

Mergers!

One subject of considerable interest is that of paper industry mergers. Mergers, in general, are restricted by the Federal antitrust laws, among which

W. L. Moise
Vice President
Blyth & Co., New York

Section 7 of the Clayton Act declares certain mergers and acquisitions to be unlawful, ". . . where in any line of commerce in any section of the country the effect of such acquisition may be substantially to lessen competition, or to tend to create a monopoly." It is well known that International Paper, Scott, Crown Zellerbach and Continental Can have already had litigation under this clause, some of which have been resolved and some of which are still pending. By careful selection and observance of legal obstacles, one large company has within the last five years made 15 corporate acquisitions and another has made nine acquisitions without legal entanglements.

I'm for good mergers as I believe they are the best means often available for accomplishing integration of raw materials with finished and converted products. Geographical plant dispersion is the surest answer to rising freight rates. Diversification in product lines, markets, skills and processes is healthy in view of constantly changing demands and new developments. Above all, mergers make available financial resources adequate to carry large budgets for research and development programs.

Research Neglected

Research, I conceive to be the most important and often neglected aspect of the paper industry — an aspect to which investment analysts give great weight. This fine school dedicated to training men in the pursuit of new knowledge and new techniques for the paper industry, seems an appropriate place for a serious discussion of industry research.

For comparison I refer to the chemical industry, while aware that many of the fundamental problems are different. Still, the great bulk of the chemical industry's sales volume is in such staple lines as sulphuric acid, ammonia, chlorine and caustic soda — bulk lines just as staple as newsprint and linerboard. But while pursuing the steady bread-and-butter staple products that require little new research, the chemical companies seem to be striving harder for new lines than are paper companies, and with more success.

According to a recent survey of capital investment and research expenditures of major industries made by the McGraw-Hill department of economics, these are some figures to think about.

In 1957 the chemical industry invested 1.7 billion dollars in new production facilities, about twice the 800 million spent by paper. In the same year, chemical makers spent $567 million on research and development or 11 times the $48 million by paper makers. Are the chemicals spending too much on research to support their future growth — or is paper spending too little? Are the potential results for research so much less in paper than in chemicals?

Chemicals Encroaching

Two recent signals show how the chemical industry may be encroaching on pulp and paper. For one thing, DuPont finally seems determined to capture a larger share of tire cord market for nylon in spite of their position of large rayon cord producers. Union Carbide is boldly advertising the superior qualities and lower costs of polyethylene vs. cellophane for packaging. When DuPont and Union Carbide start sledgehammer merchandising for particular lines, they are likely to be sure of their ground. Both rayon tire cord and cellophane are made of dissolving pulps for which excess capacity already exists. Polyethylene and other synthetic films have already taken some good paper and paperboard markets. Is it a sure bet they will not take more?

Research Expenditures

The paper and allied trades have annual sales of $11 billion and spend slightly less than ½ of 1 per cent of that amount on research and development. That is about 1/25 of annual profit before income taxes. Yet some leading paper companies have reported research and development budgets exceeding 1¼ per cent of sales. If the whole industry stepped up to that figure you would be looking at research and development expenditures of $125 to $150 million a year instead of $50 million. Remembering an assumed lead-time of about five years to turn successful laboratory research into commercial profits, would such budgets pay and are they possible?

How Scott Speeded Up Paper Mill Belt Drives

A 50 per cent gain in speed was obtained through use of ductile iron split taper cone pulleys and leather-plastic belts.

A. W. Hilliard

Paper Mill Design Engineer
Scott Paper Co., Chester, Pa.

Scott Paper Co. has found an attractive solution to the age-old problem of how to speed up taper-cone pulley drives. The maximum safe operating rim speed on completely split cast-iron pulleys is 6,000 f.p.m. and the recommended maximum speed on leather belting is also 6,000 f.p.m. Both of these limitations have now been overcome by the development of a split taper-cone pulley made of ductile iron. The prototype pulley actually had an allowable rim speed of 14,000 f.p.m., as calculated on its tensile strength of 70,000 p.s.i., but we felt that it would be over-optimistic to set such a high standard. Our insurance company gave its approval to use the new type of pulley at rim speeds up to 9,000 f.p.m.—a 50 per cent gain in approved speed over the former pulley.

Leather-Plastic Belting

To overcome the limitation on belting speeds, we are running the new pulleys with a combination leather-plastic belting, which has both a high tensile strength and a high coefficient of friction. The polymer ribbon, which carries the tension load, is bonded to a friction surface of high-grade, chrome-tanned leather. The normal rated speed of this type of belting is 9,000 f.p.m.—again a 50 per cent gain in allowable speed.

Where originally three-ply leather belts eight inches wide were being used, we are currently running four-ply belts only 3¼ inches wide. In general, the new combination belting is about one-third the width of the leather belt it replaces. In spite of its narrow width and lighter weight, the new belt will generally outpull the wider belt because its leather surface has been tanned to achieve a high degree of friction.

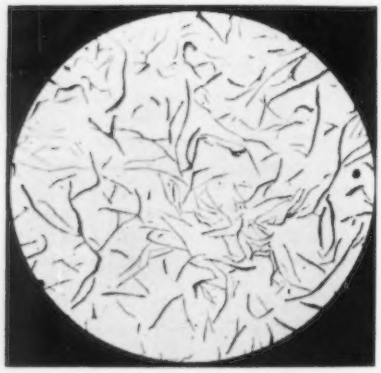


FIGURE 1—In ordinary gray cast iron, random graphite flakes break up the continuity of the metal matrix. These set up, in effect, a series of notches to act as stress concentrators.

Ductile Iron the Key

The designer and manufacturer of the pulleys, T. B. Wood's Sons Co., Chambersburg, Pa., is licensed by International Nickel Co. Inc., to pour castings of ductile iron. Ductile iron combines many of the best features of steel and cast iron. Like cast iron, it has good fluidity, is easy to cast and is readily machineable. Like steel, it has high tensile strength and is tough and ductile.

Ordinary gray cast iron is brittle because of the presence of random graphite flakes, as pictured in the photomicrograph, Figure 1. These flakes break up the continuity of the metal matrix and set up, in effect, a series of notches to act as stress concentrators.

By the addition of a small amount of magnesium in the melting process, startling change in micro-structure is obtained. The graphite is transformed into tiny spheres, as shown in the second photomicrograph, Figure 2. By causing the graphite to take a spheroidal shape, the weakening and embrittling effects are greatly reduced. The spheroidal graphite presents a minimum number of discontinuities in the surrounding matrix; hence a ductile alloy is obtained that is far stronger and tougher than any other cast iron.

At present six types of ductile iron provide various combinations of strength, ductility and toughness. Our pulleys were cast from type 60-45-10, which is intermediate in price between cast iron and cast steel and has the following mechanical properties:

Tensile strength	60,000 to 80,000 p.s.i.
Yield strength	45,000 to 60,000 p.s.i.
Elongation (min. ⅝-in. section)	10 to 17%
Hardness (min. ⅝-in. section)	160 to 210 Brinell

The manufacturer was asked to supply with each pulley a certified report

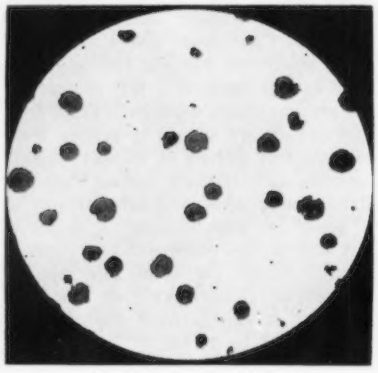


FIGURE 2—In ductile iron, the graphite is transformed into tiny spheres, presenting a minimum number of discontinuities in the surrounding matrix. Weakening and embrittling effects are greatly reduced.

on mechanical properties and chemical composition as ascertained from a test bar poured with the pulley. The tensile strength of the test bar was also stamped on the pulley hub.

New Pulley Design

The taper-cone pulley has a split arm, rim and hub. Separation of the two halves during casting was provided by ductile-iron shims. The shims were placed in the mold instead of split sand cores. The shims had tapered recesses about ¼ inch deep. The recesses were alternately placed on either side of the shim. When the hot metal was poured into the mold, it ran into the recesses but did not knit with the cold metal of the shims.

The shims separated the casting halves so effectively that it was not necessary to saw them apart. After the casting halves were cleaned, the shims were replaced, and rim and other bolts were drawn up in preparation for machining. Lugs on the castings fit into recess holes in the shims, making perfect dowels.

The shims are approximately ⅜ inch thick. Their width equals the distance from the inside of the lug to the outside of the casting. T. B. Wood's Sons Co. has applied for a patent on the split-pulley separator.

In designing the pulleys, it was decided to omit return flanges as they are not necessary to stiffen the rim. Flanges add considerably to the centrifugal force exerted by the rim, requiring heavier rim bolts and larger and heavier rim lugs. With flanges, it would be difficult to insert the necessary rim bolts, particularly on the 18-inch face pulleys.

Two sets of ductile-iron pulleys with the combination plastic-leather belting are presently in operation in our Chester plant and a third set is on order.

Paper Machine Drive

The first set of pulleys, Figure 3, is on the wet-end drive of a 168-inch trim paper machine. The pulleys were installed so the machine could be operated with the pulley rim speed within a range of 6,200 to 6,500 f.p.m.

The pulleys have the following dimensions:

Driver pulley: 67 7/8 in. by 66 in.; face 18 in.; bore 9 7/16 in.; keyway 1 1/2 by 5/8 in.

Driven pulley: 71 3/8 in. by 69 1/2 in.; face 18 in.; bore 6 3/16 in.; keyway 1 1/4 by 5/8 in.

Both pulleys are completely split through rim, arms and hub.

Rewinder Drive

The second set of pulleys, as shown in Figure 4, is on the rewinder drive of a 168-inch trim rewinder. They are part of an installation designed to improve the safety operation of the machine. These pulleys operate at rim speeds up to 7,850 f.p.m. No operating or maintenance problems have been experienced in the eight months they have been in service.

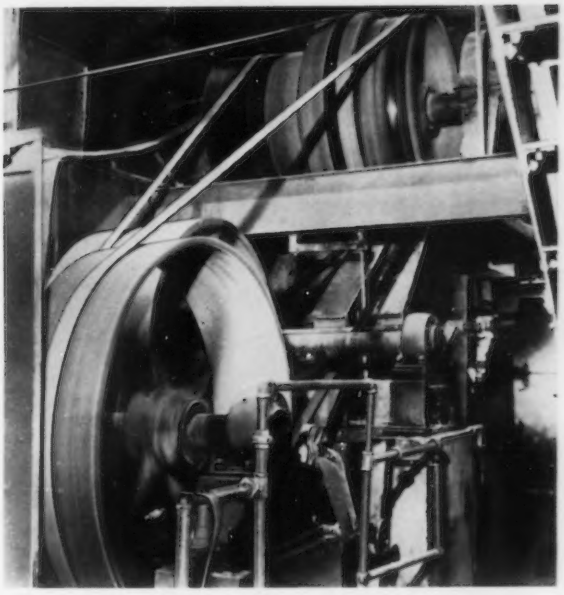


FIGURE 3—Ductile-iron pulleys drive belt at right. These pulleys are on the wet-end drive of a 168-in. trim paper machine.

In both Figures 3 and 4, the ductile-iron pulleys are distinguishable from the cast-iron pulleys by the fact that the cast-iron ones have return flanges. Return flanges have been eliminated on the ductile-iron pulleys.

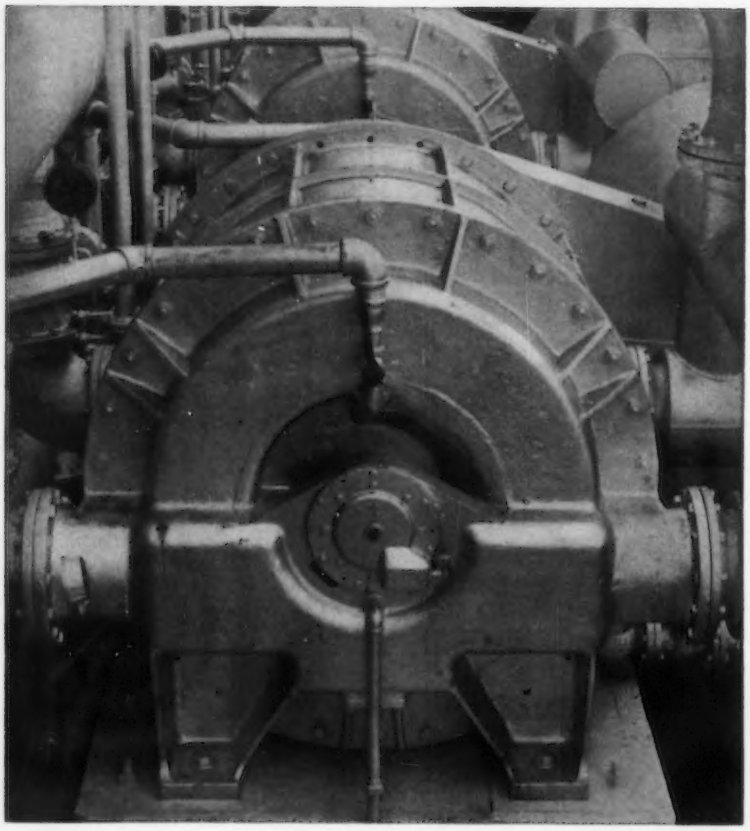
Pulleys shown in Figure 4 have the following dimensions

Driver pulley: 49 13/16 in. by 47 13/16 in.; face 27 in.; bore 6 3/16 in.; keyway 1 1/2 by 7/16 in. Pulley is completely split through rim, arms and hub.

Driven pulley: 31 by 29 in.; face 27 in.; bore 6 3/16 in.; keyway 1 1/2 by

FIGURE 4—Ductile-iron pulleys (right) may be distinguished from the cast-iron pulleys by the fact that they have no return flanges, as shown on the smaller pulley at left.

High machine speeds?
High temperature headbox stock?
You need NASH Vacuum Pumps!



Air from the suction rolls on paper machines carries with it substantial quantities of moisture. This considerably reduces the effective air handling capacity of any vacuum pump except the Nash. In the Nash Vacuum Pump, because of the unique principle of operation, the bulk of this vapor is effectively condensed inside the pump. The total capacity of a Nash is therefore increased.

When you specify a Nash Pump it can be closely sized to the job. It is not necessary to select an over-sized unit, because the rated capacity of the Nash may be relied upon.

That is one of the reasons why Nash Vacuum Pumps are installed in over a thousand leading Paper Mills. An engineer from Nash will be glad to survey your mill, and make recommendations, entirely without obligation to you.

NASH ENGINEERING COMPANY

441 WILSON ROAD, SO. NORWALK, CONN.

7/16 in. Hub of pulley is split but rim and arm are solid.

This application of ductile-iron pulleys with combination leather-plastic belting is particularly interesting because drive requirements could be met without the usual installation of a gear unit. Substantial savings were, therefore, possible because of lower installation and maintenance costs.

A third set of ductile-iron pulleys is at present on order to replace an existing set of cast-iron pulleys. This set of pulleys will be installed so the paper machine can be safely operated at a higher rate of speed.

Specifications call for all pulleys to be dynamically balanced for rim speeds of 9,000 f.p.m. after being drilled for lagging. Drilling and all other machining was done by the manufacturer.

The Belting

Though a relatively new product to the American market, the combination leather-plastic type of belting has been the standard of the European paper industry for many years. Some months ago we equipped several press drives with it and had only one failure due to an improperly made joint. To date, no maintenance has been necessary. The decision to use the composite belting with the new ductile-iron taper-cone pulleys was prompted largely by our own successful experience with this belting in other applications.

Albert Hilliard, author of this article, currently is a section head in paper mill design engineering at the Chester, Pa., plant of Scott Paper Co. He has been with the company since 1938, although his Scott career was interrupted by military service in World War II. Before joining Scott, he was employed by General Steel Castings Corp., Eddystone, Pa. He received a mechanical engineering diploma in 1942 from Drexel Institute of Technology evening school. He was an anti-aircraft officer during World War II.

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THE GLIDDEN COMPANY

Chemicals-Pigments-Metals Division

Baltimore, Md. • Collinsville, Ill. • Hammond, Ind. • Scranton, Pa.

Accurate Control of Starch Mixes and Clay Slurries . . .

. . . is obtained with industrial liquid meters at the St. Regis Deferiet mill.

Accurate proportioning of clay, water and starch are vital in the preparation of controlled fillers and coatings for the fine printing papers that are made by the St. Regis Paper Co. at its Deferiet mill in upstate New York.

St. Regis engineers get extremely close formula control in preparing these coatings and fillers by installing automatic liquid batching meters at all batch tanks. More than a dozen such meters are now metering water, clay slurries and starch mixtures, thus assuring uniform quality control throughout at St. Regis' operations at Deferiet.

In addition to providing accurate measure, the meters save St. Regis considerable time and work. Each batching meter is equipped with an Auto-Stop automatic cut-off valve. The operator sets the meter for the quantity desired, opens the valve, and the meter shuts off the flow at exactly the right gallon. It's no longer necessary for the operator to wait with one hand on the valve while the liquid inches up to the mark on a gage stick or calibrated tank. The new automatic metering system leaves the operator free for other work, such as disposing of emptied bags, cleaning up, or returning to another work station.

Preparing Clay Slurries

In the production of clay slurries, the clay is mixed with water in a large tank on the first floor. A two-inch Neptune Auto-Stop meter at this tank measures

This 2-inch Auto-Stop meter measures water into a large mixing tank making clay slurry.

Meter mounted on starch mixing tank measures water to reduce starch mix to 9%.

the water. This meter is equipped with a double-trip valve which prevents water hammer by slowing down the flow before closing.

The slurry, containing 55 per cent solids, is then pumped upstairs where it is measured through another two-inch meter into another mixer. A second meter at this mixer measures in enough water to reduce the slurry to 15 per cent. From here the slurry is pumped through the plant to several points where it is used.

Use in Beater Room

In the beater room, two more meters —one on water and one on 15 per cent clay slurry—measure out the exact quantities required to reduce the slurry to two per cent clay content. These meters are one-inch size for the 15 per cent clay slurry, and two-inch size for the water.

Installed several years ago, these meters have given such excellent service that St. Regis has ordered a new meter for a similar function at the fourdrinier machine. The new one will be for metering 15 per cent clay slurry directly into the furnish at the machine. Calibrated measuring tanks are now used for this purpose.

A one-inch meter in the beater room and a ¾-inch round-dial meter at one of the paper machines also measure clay slurry. The beater-room meter has a special water tube fitted to a threaded hole in the meter cover, just over the gear train. Water sprayed through this tube onto the gears flushes out clay particles and prevents jamming and undue wear.

All meters handling clay slurries or starch solutions are flushed out after use.

Starch Mixing

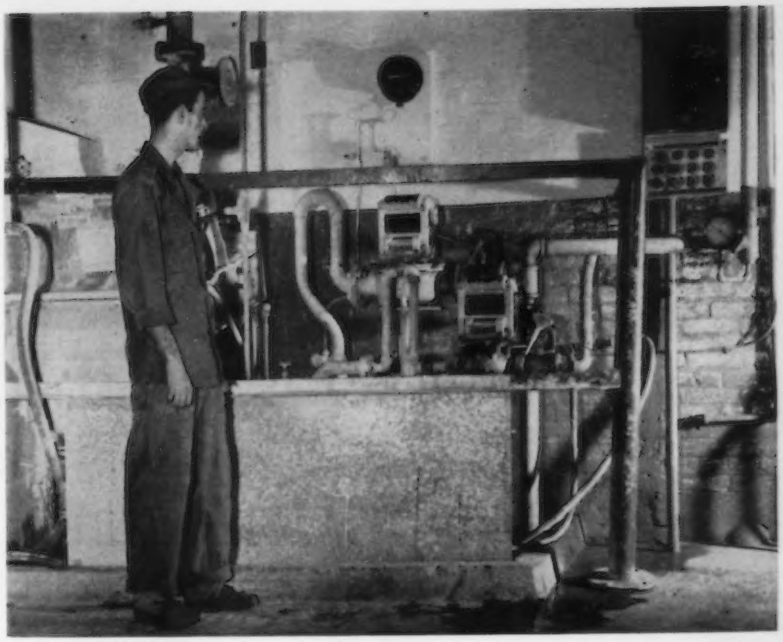
Starch solutions go through only two stages of solution and dilution. In the first stage, water is mixed with dry starch and cooked. Starch content is 20 per cent. The water is measured into the jacketed cooker by a two-inch meter with Auto-Stop register.

In the second stage the 20 per cent starch solution, still at 120°F., is pumped overhead and measured by another two-inch Auto-Stop meter. It passes through a Tyrocket screen and into a second mixing tank similar to the first. A third meter, mounted on this tank, introduces the correct amount of water to dilute the starch to eight per cent.

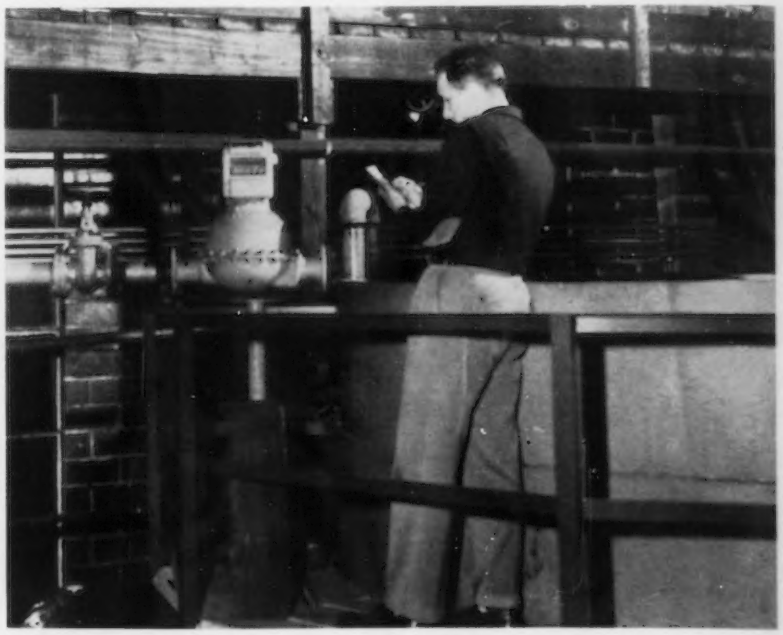
Measuring Wood Density

In their groundwood pulp mill located across the river, St. Regis engineers devised an ingenious method for the determination of wood density. In this project, large bundles of logs are weighed, then tied down in the bottom of a large tank. The tank is then filled with water through a big three-inch meter until the water reaches a calibrated mark. By reading the meter, it is possible to find the volume of the pulp wood by simple subtraction.

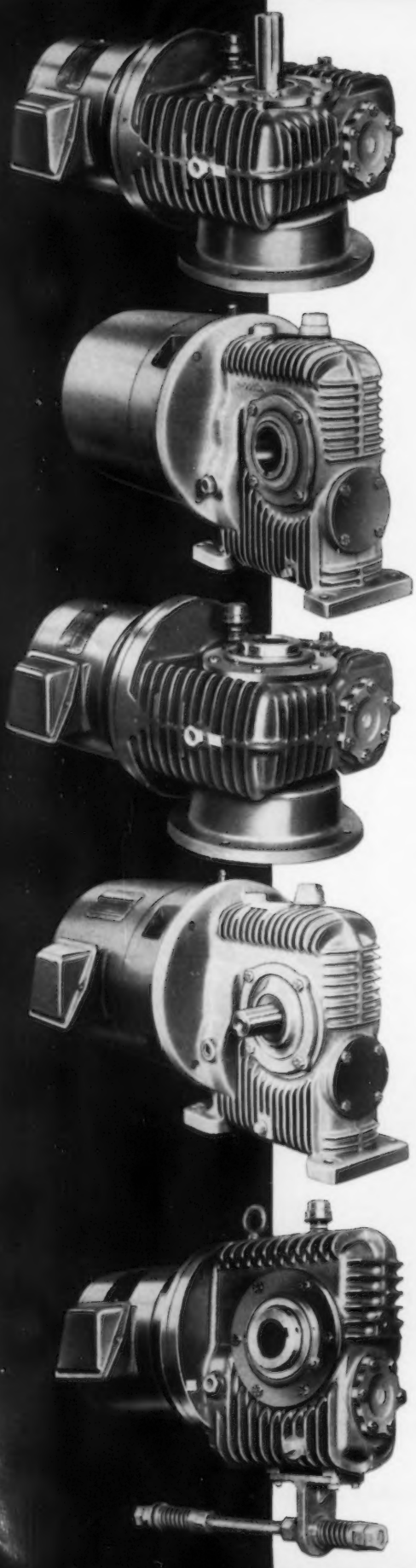
With their present "meter-awareness," St. Regis engineers have become skilled in using water meters to their fullest advantage, as this last example shows especially well.



Meters in beater room measure out exact amount of water to reduce clay slurry from 15% to 2%.



Large 3-inch water meter helps determine volume of logs by subtraction. Logs are weighed and tied down in tank, which is then filled with water to calibrated mark. Subtraction of water added from total volume of tank gives wood pulp volume.



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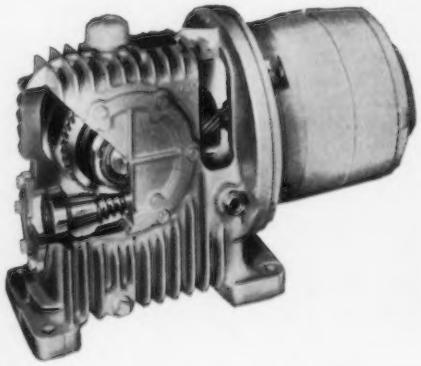

Cutaway view of typical Cone-Drive gearmotor illustrates use of double-reduction gear train for increased output power. Note also large taper roller bearings and heavy-ribbed housing.

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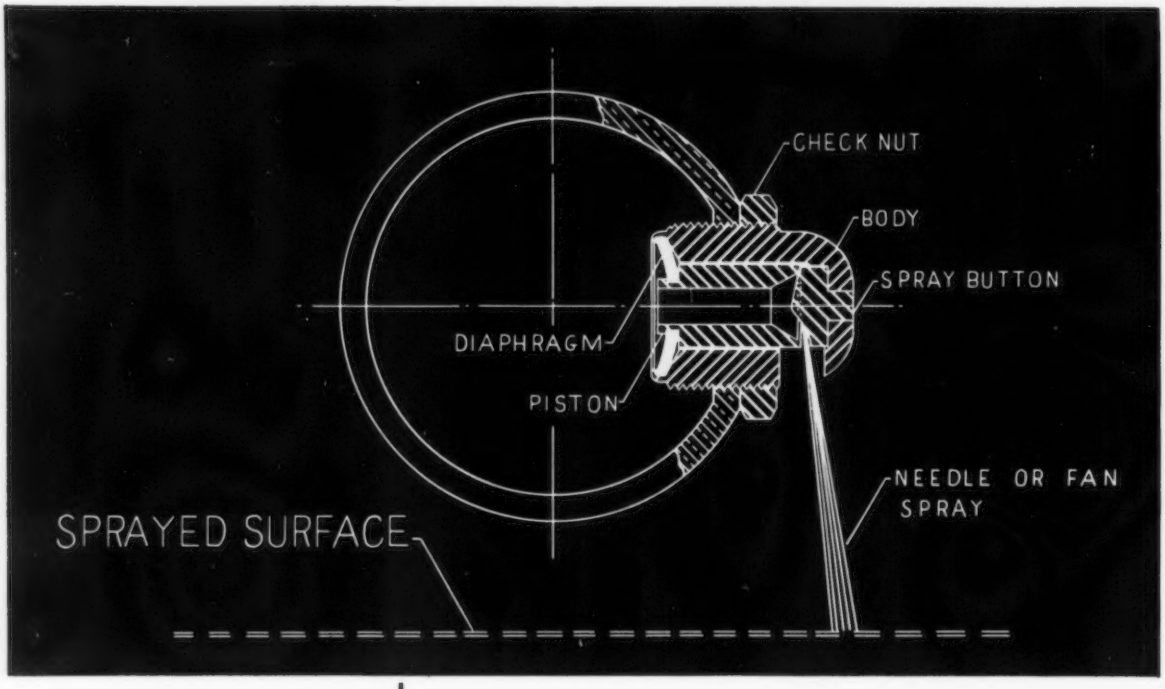

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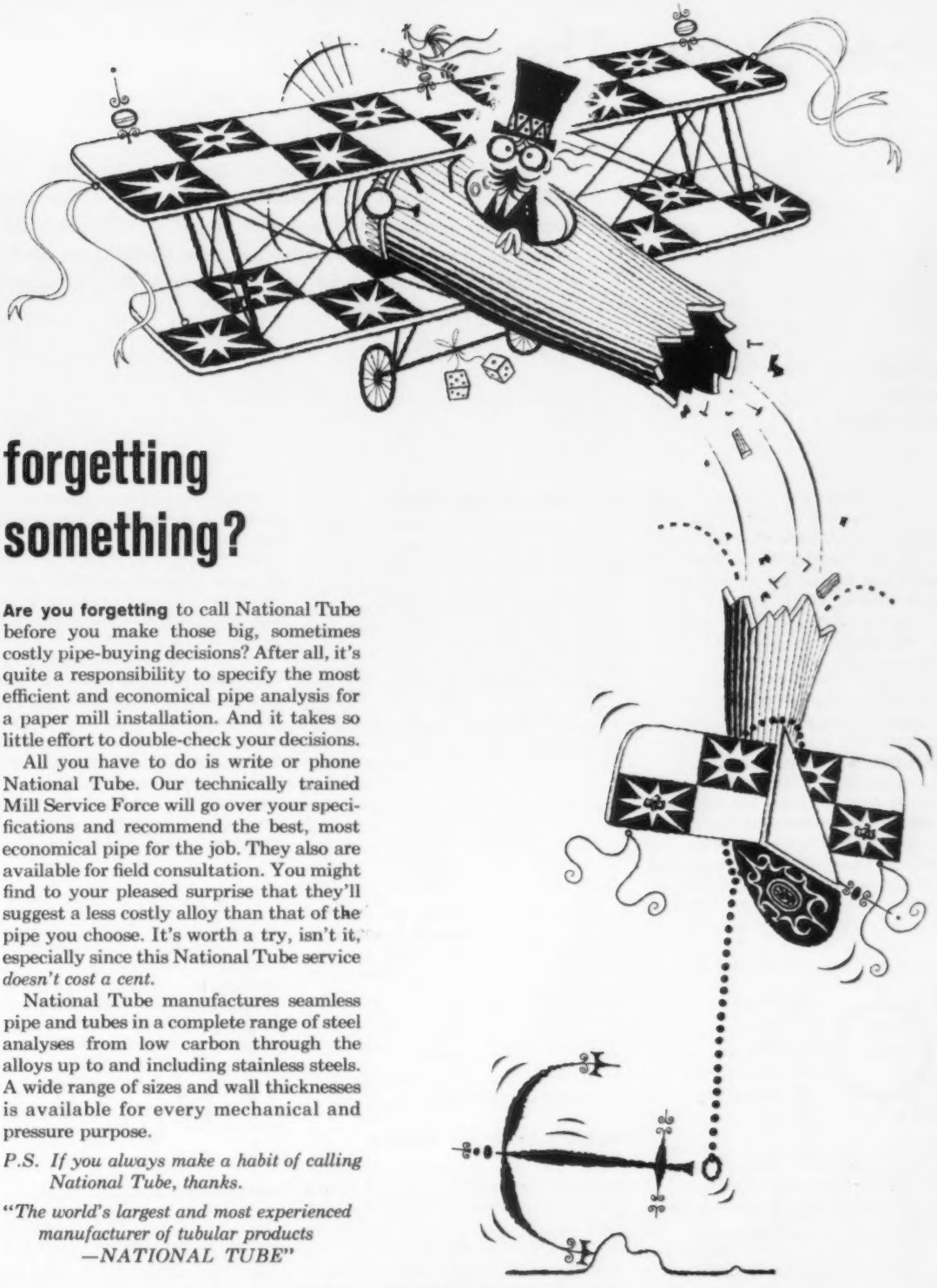

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Paper Drying Theory

It was brought to the editor's attention that this worthwhile article which appeared in the October 1956 Finnish Paper and Timber Journal was virtually unknown in this country. We therefore arranged for translation and permission to publish it in order to make this information more widely available.

Mauri Soininen
Valmet Oy
Tampere, Finland

Although numerous dissertations have been presented during the last few decades on cylindrical drying machines, most of the theories have been observed in one respect or another to be generally unsatisfactory. Two important considerations seem to have suffered from widespread neglect in these theories; namely, what happens to the material itself when it is dried, and that the drying process does not occur in a state of continuity. It should be added that the mathematical analysis in the theories is often incorrect.

The purpose of this article is not to present a new theory, but rather to express by either semiquantitative or qualitative means the happenings and phenomena upon which a correct and serviceable drying theory should be based.

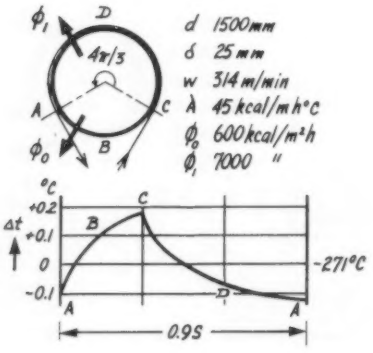

FIGURE 1. Cylinder surface temperature at different points during one revolution.
△ t means the difference between the temperature and the average temperature of the surface. The average temperature is 2.71°C. lower than the temperature of the inner side of the cylinder. (d = cylinder diameter, δ = thickness of wall, λ = heat conductivity of cast iron, w = web speed).

Dryer Roll Cylinder Walls

The transfer of heat flow, which is required for drying through the cylinder wall, can be passed over with a rather short statement. Despite the fact that the heat flow through the dryer shell is periodical, formulas which are presented for continuous heat transfer are accurate enough for most purposes. Figure 1 illustrates that the temperature fluctuations from the mean are slight and of little consequence. Thus we can write for example:

$$\phi/A = \frac{t_1 - t}{\frac{1}{\delta_s} + \frac{\delta_1}{\lambda_1} + \frac{\delta_2}{\lambda_2} + \ldots} = K\,(t_1 - t)$$

—where ϕ/A is density of the heat flow, t_1 is the condensing temperature, t is some other temperature (for example dryer surface, inner surface of web, etc.) and

$$\frac{1}{\delta_s}, \frac{\delta_1}{\lambda_1}, \text{ etc.}$$

are resistances to heat transfer between the temperatures t_1 and t.

Where Evaporation Occurs

Let us now consider the web. Opinions vary greatly about the drying procedure in different articles. The limit cases can be characterized as follows: In one article it was stated that the main function of the cylinders is to supply heat to the web for the evaporation that happens between the cylinders, and that at least in the felt machines the evaporation on the cylinders would be small. According to the opposite opinion, about 80 per cent of the water leaves the web while it is on the cylinders and the evaporation between the cylinders is less important.

It is easy to prove that the former of these explanations is unstable. If the web warm-up speed on the cylinder is being analyzed by assuming warm-up of web happens without any heat going from the web into the felt at the same time, we get the results as shown in Figure 2.

We can see from the figure that with the usual combinations of machine speed and web weight per square meter, the entire web would have time to warm up to the maximum temperature. The outcome would be that with the cylinder surface temperature being over 100°C. evaporation would be practically independent from the steam pressure, which of course disagrees

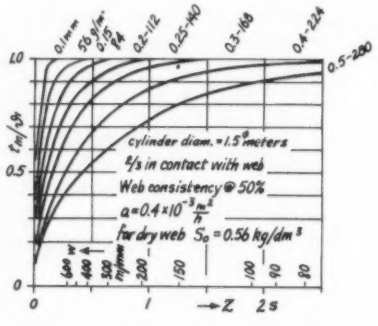

FIGURE 2. The difference between the average and the starting temperatures of different webs t_m as a function of time z, when the temperature at the beginning is constant in every point of the web and at the time z = O the other surface's temperature is being raised by the amount of θ and the other surface does not permeate any heat.
For example the marking 0.2-112 on a curve means a web 0.2 mm. thick and with the weight per square meter 112 g/m². If z means the contact time on the cylinder, the corresponding co-ordinate value would be the final temperature of the web when leaving the cylinder. The traveling speeds of the web that correspond to the time of contact are marked on the abscissa axis.

with the experience. Furthermore it can be proved by calculation, that the evaporation rate between the cylinders is not big enough to explain the evaporation rates observed in practice. Analysis in some separate cases gave the results shown in Figure 3.

The 0.8-meter-long free span from one cylinder to another used in the calculations represents about 20 per cent of the whole web length. The calculated values 21.0 kg/mh and 18.4 kg/mh represents specific evaporations about 6.7 kg/m²h and 5.9 kg/m²h in relation to the cylinder area in contact with the web. These specific evaporations are much smaller than observed in practice. For reasons stated we are justified in rejecting this first theory. The latter theory, which suggests that drying occurs both on the cylinders and between them, is more plausible.

To continue about drying between the cylinders, we find the web uses the heat reserve obtained from the cylinder. When the drying advances, the heat capacity of the web decreases, because the water it contains decreases. It follows that the drying rate between the cylinders decreases towards the dry end of the machine. This is also shown by the curves in Figure 3.

Montgomery shows in an excellent article (Tappi, Vol. 37, 1954, page 1) a number of experimental results concerning drying rates on different types of machines. Especially clear are the curves that represent the moisture contents in relation to the dry contents as a function of distance from the wet end of the machine. The lines are surprisingly straight in the main part of the machine. The drying rate is generally rather constant except some first dryers and the very last dryers (especially if overdrying happens).

We just stated that the evaporation between the dryers slows down towards the dry end. Therefore, we have to assume, in order to explain the practically constant drying rate in the main part of the machine, that drying on the cylinders increases towards the dry end of the machine.

Gas Pores in the Web

If the web temperature is below 100°C. and there is a temperature gradient and there are open gas-filled pores in the web, we can assume that the gas in the pores is saturated moist air and has approximately the same temperature as the adjacent web. Because of the temperature gradient, there is a partial pressure gradient of water vapor in the web in the same direction which causes a diffusional vapor flow in the web.

If the web temperature is 100°C., the pores have to be filled with saturated steam of one ata pressure

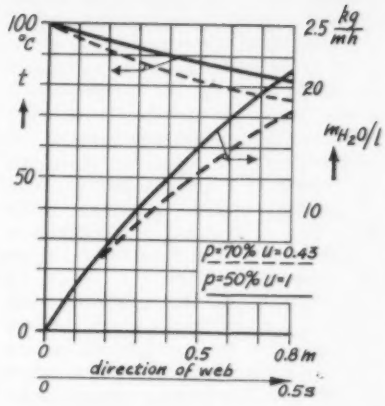

FIGURE 3. Web temperature t and the evaporated amount of water in relation to the web width $m_{H_2O/l}$ between two cylinders as a function of the distance freely traveled by the web in some special cases (p = dry contents in relation to the total weight, u = moisture contents in relation to the weight of dry contents).

(1 ata = 1 kg/cm²). The partial pressure differences and the diffusional vapor flow do not occur, but steam flow can happen in the web instead, due to the absolute pressure differences. Because the amount and size of the open pores increases towards the dry end, the size of the steam flows increases towards the dry end. The happenings might occur simultaneously so that in that part of the web where the temperature is 100°C. the steam flows due to the absolute pressure difference, and in the part that is below 100°C. it flows due to the partial pressure differences. This and the periodicity of happenings and the uneven distribution of water in the web over the web cross section makes the analytic observation of the happenings difficult, perhaps even impossible. Within the limits of this paper it is not possible to do more than to observe their magnitude.

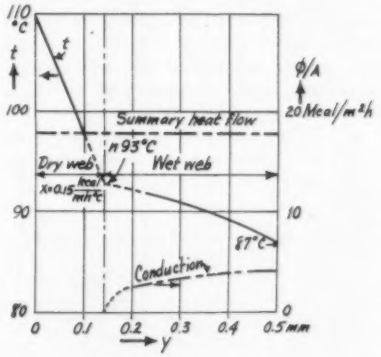

FIGURE 4. Temperature in a 0.5 mm thick web, when ϕ/A = constant = 18 Mcal/m²h, the inner surface temperature of the web is 110°C. and part of the web is quite dry. The case represents a specific evaporation value of about 27.5 kg/m²h, that due to the high temperature of the outer surface of the web (and due to the high partial pressure of the water vapour in the surface) is easy to obtain also with rather low heat transfer coefficient in the surface of the web.

Diffusional Vapor Flow

About the diffusional vapor flow, we review only the circumstances that can be considered as part of the state of continuity. We perform the following observation: We write the heat flow density ϕ/A in a point on the web as a sum of two terms

$$\phi/A = -\lambda \frac{dt}{dy} + \frac{\dot{m}}{A} \cdot r$$

—where the former term means the heat flow that moves by conduction, λ = web heat conductivity, t = local temperature, y = co-ordinate in direction of heat flow, and the latter one

"diffusion heat flow" $\frac{\dot{m}}{A}$ = density of diffusional vapor flow, r = latent heat of vaporization of water.

$$\text{Here } \frac{\dot{m}}{A} = -a \cdot \frac{D}{RT} \cdot \frac{p_o}{p_o - p} \cdot \frac{dp}{dy}$$

D = diffusion constant, p_o = total pressure, p = water vapor partial pressure, R = steam gas constant, T = absolute temperature and a = correction coefficient, whose value depends on the porosity and structure of the web, being bigger when there are more open pores.

After substitution and some converting we get:

$$\phi/A = -\left(\lambda + a \frac{Dr}{RT} \cdot \frac{P_o}{p_o - p} \cdot \frac{dp}{dt}\right) \frac{dt}{dy}$$

$$= -\left(\lambda + a \cdot \lambda_d\right) \frac{dt}{dy} = -\lambda_n \cdot \frac{dt}{dy}$$

Here λ_d represents the increase to the heat conductivity due to the diffusional vapor flow of the pores and λ_n the ostensible heat conductivity of the web.

Provided there is free water in the web pores, the steam pressure in the pores is the same as that of the saturated water of corresponding temperature. The derivative $\frac{dp}{dt}$ in the above formula is obtained by deriving the saturated water vapor pressure with regard to the temperature. The derivation is obtained from the steam tables

and λ can be calculated. The result is in the table below.

$$\lambda_d = \frac{Dr}{RT} \cdot \frac{Po}{Po-P} \cdot \frac{dp}{dt}$$

t/°C.	λ_d/ kcal / mh°C.	t/°C.	λ_d/ kcal / mh°C.
10	0.035	60	0.52
20	0.062	70	0.90
30	0.11	80	1.70
40	0.18	90	4.36
50	0.31	95	10.6

The diffusional vapor flow increases the heat conductivity of the web ostensibly. We can find that the heat conductivity of the pores is bigger at temperatures over 60°C. than that of the liquid water. On the other side the ostensible heat conductivity of the web is affected also by the size of the cross section of flow available for the diffusional vapor flow (the bigger it is the bigger is coefficient a in the last formula).

I have calculated an arbitrarily selected special case by using calculated ostensible heat conductivity values. The results appear in Figure 4.

The specific evaporation value of the example is of usual magnitude for the Yankee dryers, where due to the long contact time a kind of state of continuity is reached. Smaller values are to be expected for the regular drying cylinders because of periodicity.

Resistance to Heat Transfer

In order to obtain a flow in the 100°C. web, an absolute pressure difference is needed. The water in the web limits the wet web temperature from rising over 100°C; the only resistance to heat transfer from the dryer roll surface to the web is the thin layer of steam or moist air between the roll and the paper.

According to the information I have received, the dryer felt tension is, for example, $\delta = 2.5$ . . . 4kp/cm. That causes an overpressure in the layer of gas $p = \frac{\delta}{r}$. With the mentioned lower limit we get the magnitude of the overpressure on a cylinder, size $2r = 1.5$ meters:

$$p = \frac{\delta}{r} = \frac{2.5 \text{ kp/cm}}{0.75 \text{ m}} = \frac{1}{30} \text{at} \approx 25 \text{mm Hg}$$

If the surface of the web is overdried the overdried layer will form the resistance to the heat transfer. Then the steam overpressure in that layer is smaller than, or equal at the most to, the value just calculated.

According to Vollmer (*Ch. Ing. Techn.*, 26 (1954), No. 2, p. 91) the size of pores in the paper web is for example 0.8×10^{-4} cm. If we for the sake of argument assume the web is 0.3 mm. thick, the cross section of the pores is 20 per cent of the surface of the whole web, that the overpressure is about 5 mm. Hg and the felt is below 100°C.—when condensing happens immediately in the web, we would get the density of the steam flow by using Poiseuille's known formula: about 6 kg/m²h. The degree of magnitude is of the same class as the evaporation on the cylinder machines.

It should also be mentioned that right on the first dryers where the web is thoroughly wet and almost without any gas-filled pores, the vaporization occurring in the contact surface might push the water ahead of it and the water in liquid form would flow into the dryer felt. If such a flow exists, which is quite possible if the surface temperature is greater than 100°C., it might be according to rough calculations of the same magnitude as the above steam flow.

Other phenomena such as the capillary condensation and the molecular diffusion, that belong closest to the drying process in the hygroscopic field, are to be left outside this discussion.

Drying Felts

All water that leaves the web when it is in touch with the dryer evaporates secondarily from the felt. Thus the felt takes an active part in the drying process. On the basis of figures presented I would dare to say that the flow of water into the felt is of the magnitude of 50 per cent of the whole evaporation. Higher values have been stated: Sherwood estimates as high as 80 per cent may be possible in some special cases.

Large amounts of water being removed from the drying felt, seems at first to be in conflict with the fact that the drying surface of the felt usually represents only about 15-20 per cent of the whole drying surface. The explanation, however, is simple: The main part of the heat needed for evaporation comes from the dryer shells because the water that flowed or diffused into the felt comes to the felt mainly in form of vapor. At least part of the vapor condensates into the felt first, thus the latent heat of evaporation being made free will raise the temperature of the felt. The water evaporates as in conventional air drying when the felt moves freely between the cylinders and returns to the beginning of the group of dryers. The evaporation then is using up the heat reserves in the felt, and its temperature drops. Evaporation occurs of course from the outer surface of the felt also, when the felt is on the dryer. The purpose of the felt dryers remains only to replace the convective heat flow from the felt to the drying air and other heat losses to the environment. These amounts are small in comparison with the amounts used for the evaporation of water; they may be only about 100 kcal per kilogram of removed water, therefore felt dryers are needed relatively less than the actual dryers.

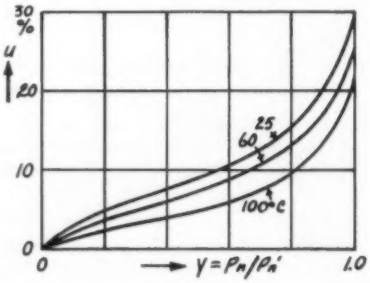

FIGURE 5. Some absorption isotherms of a hygroscopic material. (Pn = partial pressure of steam, P'n = saturation pressure of steam, y = relative humidity determined as ratio of partial pressure, u = moisture content of material in per cent of dry substance).

Drying Air

A few words are justified about the part of air in the drying process. The specific evaporation in any part of the web or felt is directly proportional to a potential difference. This potential is the partial pressure of the steam, but in most cases the x-value of the air can be chosen as potential with sufficient accuracy. The theory of bordering layers dictates that the air immediately touching the surface of the web or the felt is saturated air at the temperature of the web or the felt. Because the x-value of the surrounding air is lower, a potential difference is caused that produces evaporation. When that potential difference is multiplied with a coefficient, that is called mass transfer coefficient, then the value of the specific evaporation is obtained. Due to the high temperature of the web the x-value of the air on its surface is high: for example at 70°C. about 0.28 kg/kg, at 80°C. about 0.55 kg/kg, at 90°C. about 1.5 kg/kg. Therefore the magnitude of the flow of drying air does not significantly affect the amount of evaporation directly from the web. The evaporation from the felt, however, is more dependent on the magnitude of the drying air flow. The felt temperature is lower and therefore the x-value in the surface of the web is lower: for example at 60°C. about 0.15 kg/kg.

At the dry end of the machine where the moisture of the web is below the saturation point of the fiber, the hygroscopic characteristics of the web are

customarily represented by the curves of absorption isotherms.

The water in the hygroscopic area of the web has different characteristics than the free water. The saturation steam pressure of water that is bound to the web is lower than that of the free water. With a given web moisture content at a given temperature, this saturation pressure is obtained by multiplying the saturation pressure of the free water by the y-value taken from the curves of the isotherms. The web discussed is in balance with air when their temperatures are the same and when the water vapor partial pressure is equal to the calculated saturation pressure of the "hygroscopic water" in the web. This air is in fact saturated in the surface of the web. If these prescribed conditions of the saturated air are transferred to the i, x-diagram of the moist air, and if the points that belong to the same web consistency but to different temperatures are joined, then curves as shown on Figure 6 are obtained.

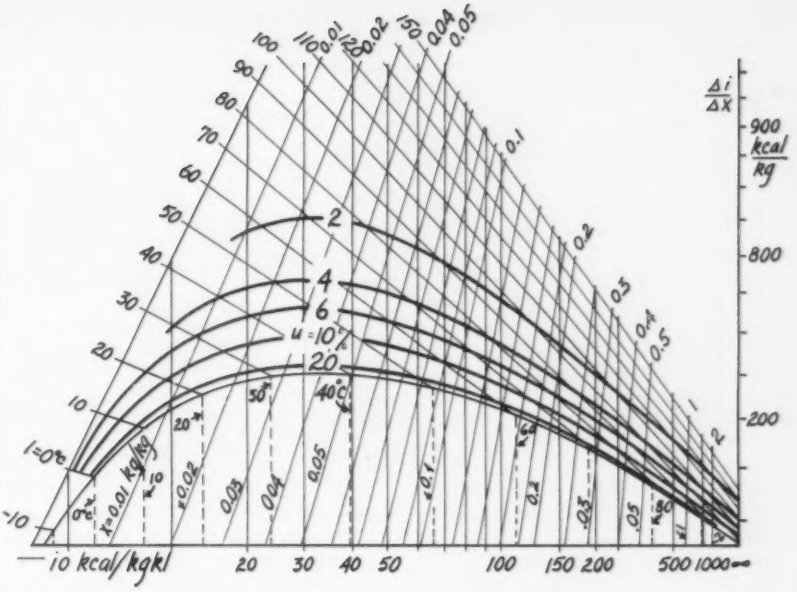

FIGURE 6. Saturated air conditions in relation to different web moisture contents.

These curves are saturation curves for air that is in contact with a web of specified moisture consistency. We can read from the figure, that for 90°C. the x-value of the saturated air right on the surface of the web is below the fiber saturation point about 1.5 kg/kg, at 10 per cent moist web about 0.8 kg/kg, at 5 per cent moist web about 0.4 kg/kg, 4 per cent web about 0.24 kg/kg, 2 per cent web about 0.075 kg/kg. The drying potential and speed are therefore decreasing rapidly on the last dryers and the specific evaporation is strongly dependent on the magnitude of the flow of drying air.

From the technical point of view the air flow in the dryer section is very poor. Pockets and channels are formed between the cylinders, web and felt, where the air flow is due to the air density differences between air surrounding the machine and the air in the pockets. The "pull" of the pocket is directly proportional to this density difference and to the effective height of the pocket. Because of this proportionality the air flow into the pockets is often rather small, and therefore the x-value of the air that actively participates in the drying is high. Thus the capacity of the machine can be raised effectively by arranging cross-blowing for the machine that will decrease the x-value of the air in the pockets with the increase of evaporation. In the fast machines, however, the cross-blowing does not noticeably increase the coefficients for heat and mass transfer. Their size is determined first of all by the machine's own speed.

Condensate Removal

In the observations discussed thus far, we have treated what goes on outside the dryer. The happenings inside the dryer are connected problems that deserve a short study. We shall limit them here to a discussion of the removal of condensate from one dryer.

At the low machine speeds the condensate can be removed from the dryer by picking it up with scoops fastened on the inner surface of the dryer. But as the web speeds are increased to about 160 m/min., the machine with cylinder sizes 1.5 m has the acceleration of the centrifugal force, that acts upon the water, = g. Above this limit the water cannot be removed from the cylinder by picking it up. In about 4.5 m Yankee cylinder the scoops can be used up to about 280 m/min.

Above the speed limit $w = \sqrt{gr}$ either rotating or stationary syphon pipes are being used for the removal of condensate.

Let us first study syphon pipes that rotate with the cylinder.

In order to remove the condensate, a pressure difference approximately equal to the dynamic pressure of water at the speed of the machine is required between the condensate in the dryer and the condensate that discharges through the dryer shaft.

Please note that the pressure in the condensate discharge piping is lower than the saturation pressure of condensate in the dryer. Because of that, flashing steam has to separate from the removed condensate, being only a fraction of the weight of the removed condensate flow, but being dominating in the amount of volume. Thus steam is flowing to the condensate piping mixed with drops of condensation.

It is known, that at the high speeds the condensate can form a continuous layer on the circumference of the dryer. Let us estimate the limit speed at which that is possible . . . Assuming that the velocity of the condensate is equal to that of the cylinder at the lowest point and that the rise of potential energy of the condensate happens at the cost of its dynamic pressure. At the highest point of the cylinder the condensate layer still has to have so much velocity, that the centrifugal force acting upon it is at least equal to the pull of gravity. A simple calculation will show, that the critical speed has a value $w = \sqrt{5gr}$. The condensate layer in the 1.5 m cylinders would be stable at the speeds w = 360 m/min. The calculation is to be considered quite approximate. In reality the friction forces between the cylinder and the condensation apparently make the film continuous at slightly lower speeds, and that the critical speed is also a function of the thickness of the condensate layer.

Between the critical speeds determined for the 1.5 m dryer, about 160 m/min. and about 300 m/min., there is apparently a speed zone where the condensate is on the bottom of the dryer, and it cannot be removed by scooping. A pressure difference is needed to overcome the centrifugal force if the machine is equipped with rotating syphon pipes.

Because of the needed pressure difference a steam flow is created flowing through the syphon pipe at least over

this speed range. At the higher speeds the possibility of such passage of the steam flow should be kept in mind. The steam flow corresponding to the partial pressure can only be caused if there is enough heating surface after the cylinder in the next steaming unit, or anywhere else, to condensate that flow of steam. If heating surface is insufficient, then the flow of steam is smaller than what would flow through the syphon pipes at the minimum pressure difference corresponding to the machine speed. The minimum pressure difference between the cylinder and the condensate line cannot come into existence, the condensate does not discharge and the cylinder gets waterlogged with the known results. On this basis we can draw conclusions about the advantageous design of the rotating syphon: the partial pressure corresponding to the speed is necessary to overcome the centrifugal force acting on the water. The steam density is only about 1/1000 of the density of water; therefore, the centrifugal force acting on it is negligible. The magnitude of the flow of steam is determined practically entirely by the friction losses in the syphon. It is apparently advantageous to try to keep the flow of steam as small as possible. That will mean, that the cross section for flow of the syphon pipe has to narrow. It is often advantageous to construct flow restrictions there. The design is paradoxical in a way as the shape of the useful rotating syphon is in the usual meaning poorly planned from the flow techniques point of view. The resistance to flow it causes is selected as big as reasonably possible with respect to the removal of water.

No matter how the rotating syphon pipe is designed, there will be trouble when the speed of the syphon (which depends on design and size of the steaming units of the machine) allows the steam flow to become so big, that the condensing unit becomes insufficient. The pressure loss becomes smaller than what is needed for the removal of condensate. First one cylinder in the unit gets waterlogged, the pressure difference then decreases further due to the increased steam flow cross section and more cylinders are being filled with water until a stable condition is reached, where all the cylinders of the group are waterlogged.

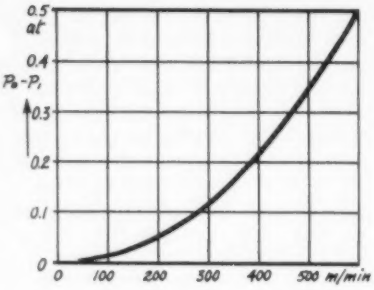

FIGURE 8. The theoretical pressure difference between the inlet steam and the condensate in a machine equipped with rotating syphons.

The conditions are quite different in case of a stationary syphon.

We notice, that the pressure difference between the cylinder and the condensate is theoretically necessary only at the small speeds and is not big even then. The necessary pressure difference is smaller the higher the speed of the machine is. At high speeds and suitable designs it is theoretically possible to make the cylinder to act as a pump with the pressure of the condensate being bigger than the pressure in the cylinder.

No flashing of steam occurs and because the opening of the syphon pipe is always in the water irrespective of whether the water is on the wall or in the bottom, the through-flow of steam does not necessarily have to happen. It is theoretically possible that plain condensate flows in the condensate piping. Because of the dynamic pressure of the water that hurls into the mouth of the syphon, being higher the higher the machine speed is, the condensate removal difficulties with stationary syphons will be the smaller the higher the machine speed is. There is no "ceiling" like the rotating syphons have. It is therefore surprising that the machine designers prefer generally rotating syphons for the high speed machines. The theoretical points of view speak for the stationary syphons. But the stationary syphons are apparently more sensitive to mechanical strain and their installation requires careful work, thus the somewhat bigger design difficulties about the stationary syphons may be one reason why they are not favored by the designers.

Why Theorize

To build up such a drying theory, that would take into consideration the different factors, that were described here in connection with drying, is a rather difficult task. Yet, even if it would be met with success mathematically, experiments are needed in addition whose purpose would be to clarify, for instance, important characteristics from the point of view of drying the web and the felt. It could be said, that the practical man does not need these theories. It could also be said, that the designer also does not need them, because he has sufficient samples and figures to base his measurements and design on.

Paper machines are far too expensive to operate for experimental purposes, therefore it is important to their development to understand the theoretical aspects of their operation. In the field of drying there is a particular lack of knowledge.

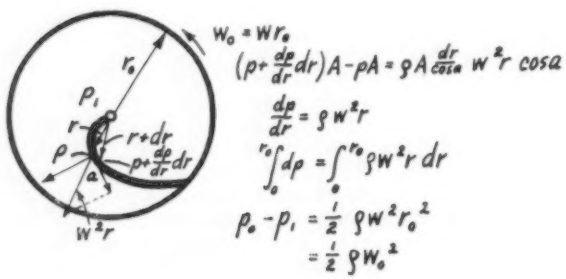

FIGURE 7. Theory of rotating syphon pipe. (w = angular speed, r_0 = internal radius, $w_0 \approx$ speed of the web, p = pressure, A = crossection of flow channel, e = density of water, p_0 = pressure of incoming steam, ph = pressure of discharge water).

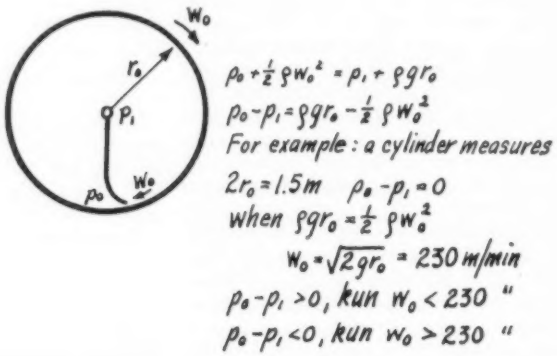
w_0
r_0
p_i
p_0
w_0
$p_0 + \frac{1}{2}\varrho w_0^2 = p_i + \varrho g r_0$
$p_0 - p_i = \varrho g r_0 - \frac{1}{2}\varrho w_0^2$
For example: a cylinder measures
$2r_0 = 1.5m \quad p_0 - p_i = 0$
when $\varrho g r_0 = \frac{1}{2}\varrho w_0^2$
$w_0 = \sqrt{2gr_0} = 230\ m/min$
$p_0 - p_i > 0$, kun $w_0 < 230$ "
$p_0 - p_i < 0$, kun $w_0 > 230$ "

FIGURE 9. Theory of a stationary syphon pipe.

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Use of Chemical Treatment in Manufacture of Groundwood

Dr. K. H. Klemm
Manager, München Dachauer Papier Fabriken
Munich, Germany

English text by
G. P. Chinn

In recent years, some new processes have been developed with the aim of either improving groundwood quality without using high cost pretreatment stages or decreasing the specific energy consumption for grinding without loss of quality. They are based on the principle that, if certain chemicals can be present in the grinding zone, they are activated by the high temperatures which exist there. This idea is not new and various patents *(1)* relating to this field have been granted during the last 10 to 20 years. These include a partial bleaching with reducing agents (Hirschkind, Bjornstad, Werle); the elimination of pitch troubles by its saponification (Schwalbe, Schwarz and Hennig); or to the improvement of groundwood quality by the addition of alkali or sodium chloride (Elsner, Samyschkina, Chambers-Allison). None of these processes were accepted by the industry for continuous practical operation. However, one recently recommended by Cochrane *(2)* has been introduced into two large Canadian newsprint mills, the deciding factor most probably being the increased production which can be obtained with the power and equipment available.

Sodium Sulphite in the Grinders

With this "Powell River Process", in which sodium sulphite is fed to the grinder in the shower water, it is emphasized that the beneficial effect of the chemical takes place in the grinding zone. When 0.5 to 1.0 per cent sodium sulphite (related to oven dry wood) was added, a decrease of the specific energy consumption from about 73.5 to 67.5 h.p. day/ton was obtained and, at the same time, the brightness increased by 2.5 points G.E. The economic optimum chemical addition is most probably around 0.8, as larger quantities result in only small further production increases if the freeness and strength properties are kept constant. No change in wood yield worth mentioning could be observed. As these data are the result of several years' experience in a large groundwood mill, they appear to be reliable.

A New Process

There must be a limit to the effect obtainable by the addition of chemicals to the shower water as only part of it will pass to the grinding zone, the remainder flowing to the grinder pit. The author has advanced a process by which all chemicals are forced to pass through the grinding zone where they are activated by the high temperatures which prevail there. This is based on a cold impregnation of the wood with neutral sulphite solution during storage using large wood ponds such as those recently introduced in the southern United States. The impregnation of wood with chemical solutions is considerably faster than with water alone as it is aided by the additional forces

TABLE I—GRINDING CHEMICALLY PRE-TREATED LOGS

	Normal Groundwood	Groundwood from Pre-treated Wood	Difference %
Load (kw.)	1950	1950	—
Specific energy consumption—h.p. day/ton (o.d.)	63.4	60.7	— 4
Production—tons (o.d.)/day	41.6	43.0	+ 3
Freeness (Canadian Standard)	96	80	—17
Initial wet strength (corrected for moisture content of sheet)	66	84	+27
Tensile—meters	2380	2990	+26
Tear factor	0.70	0.81	+16
Brightness—G.E.	60	62.7	+ 5
Long fiber fraction—%	19.8	23.0	+16
Fines—%	39.3	37.5	— 5

It must be remembered when interpreting the above, the comparison is not made at the same freeness.

TABLE II—CHEMIGROUNDWOOD IMPREGNATION DATA

Wood Species	Poplar	Birch, Beech, Maple
Yield—lb./cord	1900	2800
Total pre-treatment time—hrs.	7-8	8-11
Cooking time at maximum temperature—hrs.	4	6
Maximum cooking temperature—°C.	133	150
Cooking liquor chemical concentration—g/l.	120	180

(The average groundwood yield related to oven dry wood is about 88.5% in both cases).

of osmosis and diffusion. Two to three weeks are sufficient for the wood to take up from 1.5 to 2.5 per cent chemicals. Only minor differences in this rate are observed between wet and dry wood. With wet wood, the diffusion forces prevail and the chemicals are taken up without much increase in the moisture content. With dry wood, water and chemicals are absorbed at about the same rate.

The grinding of the pretreated wood is done in the usual manner. Trial runs with full scale grinders showed, in the average, the results reported in Table I.

A further comparison showed that the strength gains are about equivalent to those which can be achieved by the addition of 10 per cent sulphite pulp to normal groundwood. These trials were made with wet wood and higher proportional gains might be expected with dry wood because of the additional benefits which would result from the increased wood moisture content.

FIGURE 1 — First large installation for chemigroundwood production at Great Northern Paper Co., Millinocket, Maine.

Other Chemical Processes

Only a few of the numerous workers *(3)* in the field of chemical pre-treatment of the wood can be mentioned within the scope of this description. A complete literature survey was made by Libby *(4)*. An early patent by Schwalbe recommended the impregnation of wood with sodium monosulphite followed by steaming. C. Bache-Wiig made several suggestions related to the cooking of the wood blocks with sodium chloride alone, sulphur dioxide-bisulphite solutions or sulphur dioxide in combination with sodium chloride. Henckel, Zacharias and Thickens used caustic soda for wood pretreatment while Zimmermann and Parret also suggested the use of alkali. Enge proposed the use of sodium sulphate, weak sulphite cooking acid, and sulphur dioxide gas. In Norway, F. and E. Kittelsen used black liquor from a kraft mill. Weisshuhn and Possanner von Eherenthal respectively recommended sodium bisulphite and calcium bisulphite solutions. Schulte, Longheed and later, Hyttinen and Schafer again used monosulphite and their work and the work of C. E. Libby and F. W. O'Neil *(6)* resulted in the development of the "chemigroundwood process" which is commercially used for grinding hardwoods for the manufacture of newsprint.

Chemigroundwood Process

The chemigroundwood process which is used in one large North American mill was developed especially to permit the use of hardwoods for the manufacture of newsprint. Practical experience has indicated the following advantages:

1—Hardwoods, which are cheaper and more easily available than softwoods, can be used as the raw material.

2—the quality of chemigroundwood is better than that of normal groundwood.

3—The power consumption during grinding, compared with spruce normal groundwood, is reduced to 67 per cent for poplar and birch and to only 54 per cent for maple and beech.

4—The capacity of the grinders, as a result of **3,** is increased by about 20 per cent with poplar and 50-65 per cent with beech, birch and maple when compared to normal groundwood.

5—With most hardwoods, the yield is higher than with spruce. With the latter, an average yield is 220 lb./cord while with birch, beech and maple, 2800 lb./cord is reached. With poplar, the yield is lower, being only about 1900 lb./cord.

A disadvantage of chemigroundwood is its somewhat darker color (brownish) but it is susceptible to the standard normal groundwood bleaching processes. There were difficulties relating to the barking of hardwoods but these have recently been overcome.

Impregnation Stage

For the impregnation stage, it is essential that the wood is delivered with a fairly constant and not too high mois-

(Continued on page 48)

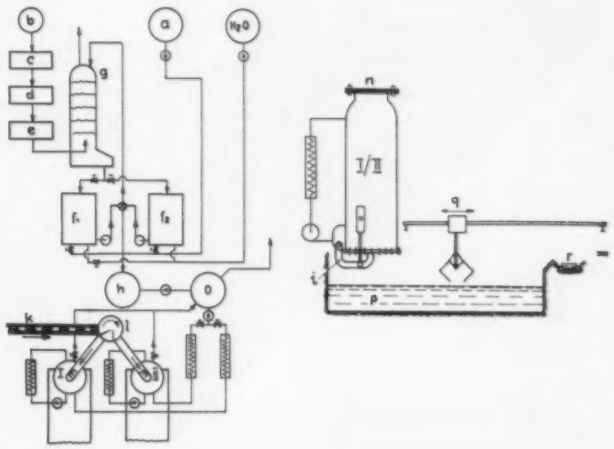

FIGURE 2—LIQUOR PREPARATION AND COOKING OF WOOD FOR CHEMIGROUNDWOOD PRODUCTION

I, II—Wood digesters; a—Storage and saturating tank for soda ash; b—Silo for storage of sulphur; c—Sulphur melters; d—Steam heated storage of molten sulphur; e—Sulphur burner; f_1, f_2—Sulphiting tanks; g—Absorption tower; h—White liquor storage tank; i—Steel door for bottom seal of digester; k—Chain conveyor for wood feed; l—Turntable; m—Filling hopper; n—Top cover; o—Accumulator; p—Dump pond; q—Grapple crane; r—Conveyor belt carrying wood to grinder room.

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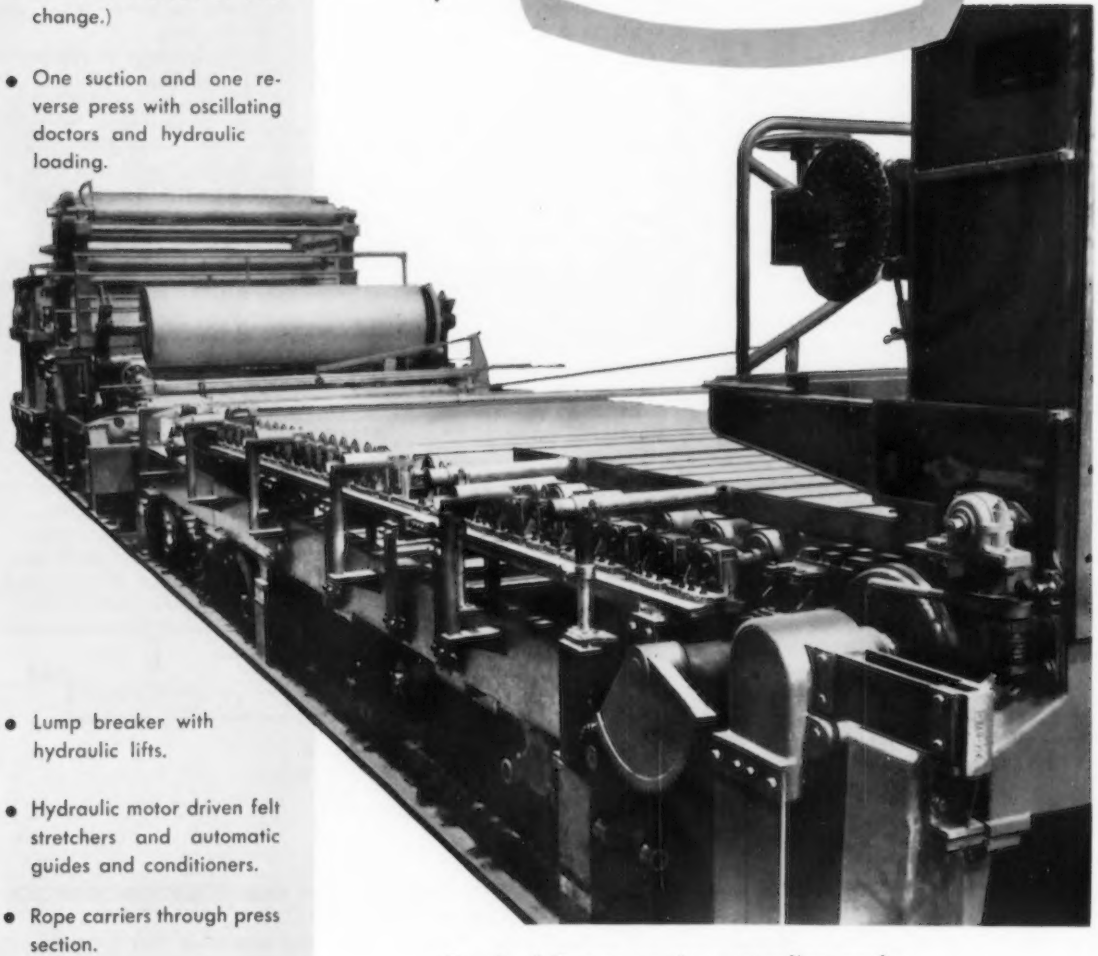

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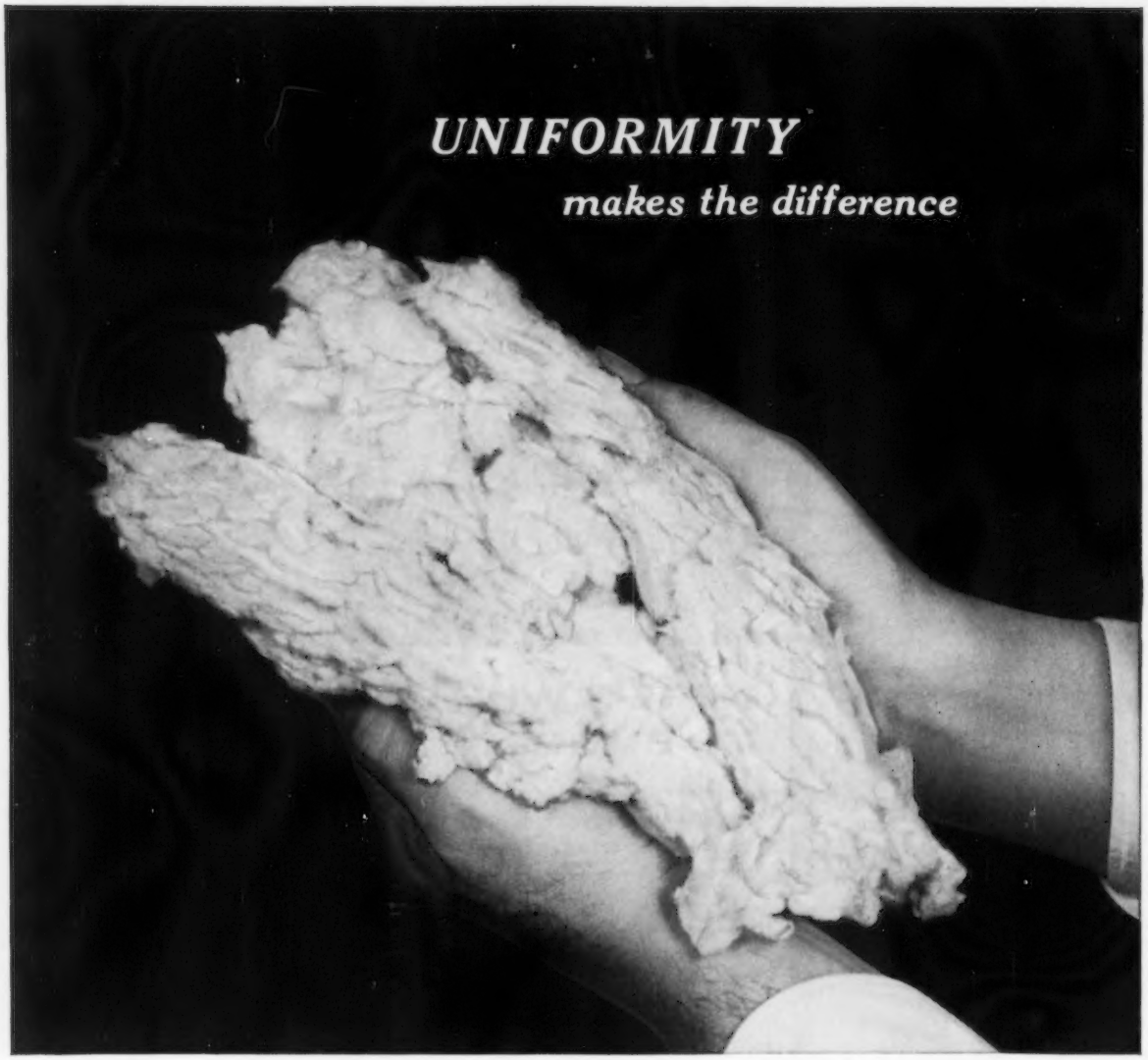

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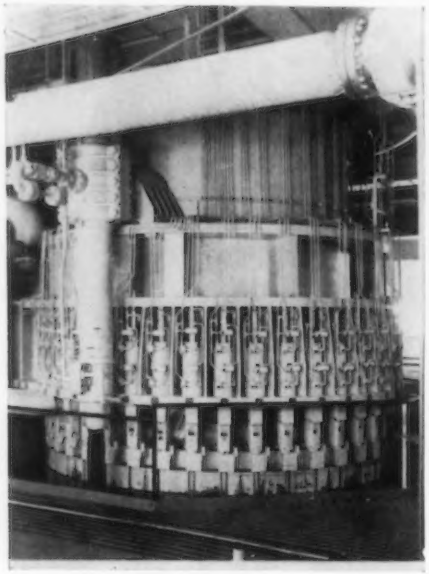

FIGURE 3—Bottom door of chemigroundwood digester showing sealing method with hydraulically operated bolts.

FIGURE 4 — Emptying a chemigroundwood digester.

(Continued from page 43)

ture content (w_t = 20 to 25% is a favorable range). As the cooking conditions must be chosen to suit the particular wood species and density, it has proven advantageous to pretreat the different wood species separately but to grind them as a mixture. From practical experience, the data in Table II

Chemigroundwood Mill at Millinocket

Because of the great interest which was created by the first large chemigroundwood mill *(7)*, in East Millinocket, Maine (Figure 1), a short description of its operation is given*.

The preparation of the cooking liquor is done according to Figure 2 using soda ash and sulphur as the raw materials. The soda ash is received as a powder which is conveyed by vacuum from the rail cars to the storage and saturation tank **(a)**. At 126°F., the saturated solution reaches a concentration, which remains relatively constant, of about 430 g./1. The sulphur is moved from the rail cars by screw conveyors and elevators to the silo **(b)**. It is discharged through a weighing hopper from this silo, melted by indirect steam **(c)** and transferred to a smaller steam heated storage tank **(d)**. This tank supplies the sulphur burner **(e)**.

The preparation of the cooking liquor is discontinuous. The saturated soda ash solution is first pumped to one of the two sulphiting tanks **(f_1, f_2)** and diluted with water to the desired concentration. This solution is then circulated through the absorption tower **(g)** to which sulphur dioxide gas from the sulphur burner is fed. As soon as the sulphiting process has been completed in one tank (pH = 7), the absorption tower is supplied from the second tank which has been filled in the meantime with the soda ash solution. The sodium sulphite in the first tank is then buffered with additional soda ash to a pH of 9.4 and transferred to the white liquor storage tank **(h)**. This frees the sulphiting tank for a new cycle. The usual ratio of sodium sulphite to sodium carbonate (as sodium carbonate) in the cooking liquor averages 6:1 but this is adjusted according to the wood species and also to control the pulp brightness.

The digesters **(I, II)** are steel cylinders 10.5 feet in diameter and 62 feet high and are closed at the bottom by a 50 ton steel door **(i)** which covers the whole cross-section. This door is hinged and opened and closed hydraulically and as a further safety factor, secured with hydraulically operated bolts (Figure 3). The digesters are partially filled with water to cushion the fall of the wood blocks which are fed mechanically through the series of chain conveyor **(k)**, turntable **(l)** and filling hopper **(m)**. As the wood level rises in the digester, the water is drained out. The digester is filled with 25-28 cords of wood in about one hour. The upper opening is then closed with the steel plate **(n)** and the digester evacuated for one half hour to a vacuum of 27 inches of mercury. Following evacuation, the digester is filled with cooking liquor from the accumulator **(o)**, care being taken that the vacuum is not broken.

The cooking temperature is controlled by cam curves and the pressure maintained at 150 p.s.i by the circulating pump. The indirect steaming principle is used. At the end of the cooking cycle, the pressure is relieved and the cooking liquor then displaced by steam pressure to the accumulator. The wood is discharged into the water-filled blow pit **(p)** by opening the bottom door of the digester (Figure 4). It is removed from the pit by grapple crane **(q)** and transported by the belt conveyor **(r)** to the grinder room. The complete installation, which includes four digesters of the type described here, has a capacity of 190-200 tons (o.d.)/day.

The grinding is done on Great Northern grinders which are arranged in two lines, each line driven by a 4500 kw. motor. With the pretreated wood, the grinder capacity at a specific energy consumption of 30 h.p. day/ton (o.d.) is about 77 tons (o.d.)/day. As a grinder-pit temperature of only 120°F. is reached despite a pit consistency of 5-6 per cent, the indication is that the generation of friction heat during grinding is considerably lower than with the normal groundwood process. The chemigroundwood produced has a freeness in the range of 250-430 (Canadian Standard) and is used along with 10 per cent sulphite and 60 per cent normal groundwood to produce newsprint on modern high speed paper machines.

In Europe, the Alb Process, which is very similar to chemigroundwood, has recently been proposed.

*The author is very grateful to J. H. Heuer of Great Northern Paper Co. for the kind permission to publish this description and for the photographs supplied.

Use of Cold Caustic Soda in pre-treatment of hardwoods is discussed in the chapter on manufacture of groundwood with disk refiners.

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(1) **Older Literature on Chemical Addition of Grinders.** Elsner, J. G., Ger-

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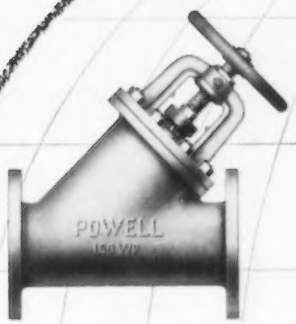


Fig. 1944—Large stainless steel "Y" Valve for 150 W.P. Outside screw stem is threaded and rises through bronze bushing in upper yoke. Flanged ends only. Can be repacked under pressure when wide open.

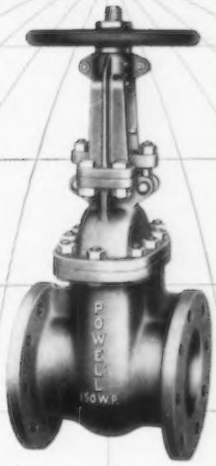


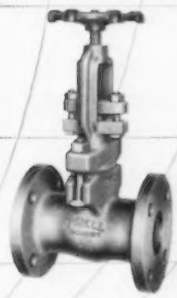
Fig. 2453 SG—Large stainless steel O.S.&Y. Gate Valve for 150 W.P. Interchangeable fully guided solid or split wedge discs, integral seats. End flange dimensions conform to MSS SP-42.

Fig. 2192—Large Ni-resist Swing Check Valve for 200 W.O.G. Permits full unobstructed flow through when disc is in wide open position. Can be used in horizontal or vertical position.

Fig. 2193—Sturdy Ni-resist Gate Valve for 200 W.O.G. Bolted flanged bonnet, outside screw rising stem, one-piece yoke. Larger valves with two-piece yoke are also available.

Fig. 1893—Large O.S.&Y. Gate Valve for pulp and paper mill service. 200 pounds W.O.G. 3½ Nickel-iron body, bonnet, yoke; 18-8S Mo, stem and screwed-in seat rings; Ni-resist guided solid wedge disc.

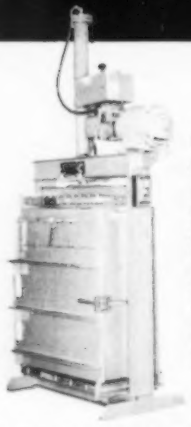
Small Ni-resist O.S.&Y. Gate Valve for 200 W.O.G. Available in two designs: Fig. 2195, regular face to face; Fig. 2196, short face to face. Also made with screwed ends.



A solution for every kind of flow control problem is as near as your local Powell distributor. Powell valves are designed and engineered in the largest variety of metals and alloys, to handle any medium, every flow control requirement. There are Powell distributors in all principal cities. Or, if yours is a special engineering problem, write to:

THE WM. POWELL COMPANY • *Dependable Valves Since 1846* • **Cincinnati 22, Ohio**

All-Steel Hydraulic
BALING PRESSES
FOR EVERY NEED



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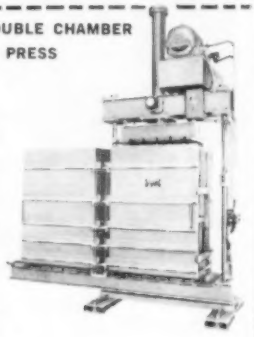
BALE-O-MAT

High-speed, easy operating press, completely self-contained; dense, compact bales, 50-500 lbs., from 4 standard models, more from custom sizes. Lowest initial, operating and maintenance costs.

TYPE DHB DOUBLE CHAMBER
DOWNSTROKE PRESS

Continuous high-speed, high-production, high-density baling; maximum efficiency and economy; 9 standard sizes. Simultaneous loading and pressing with revolving chambers; extra safety features, simple operation, no special pit or foundation needed.



TYPE HUS
UPSTROKE PRESS

Truly heavy-duty service with greatest economy, maximum production of dense, heavy bales. Outstanding construction features, extra safety devices, versatile loading (from working floor, floor above or both).

Over 50 standard types and models of hydraulic baling presses

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(3) **Older Literature on Chemical Treatment.** Schwalbe, C. G., German Patent 203,230 (1907); Bache-Wiig, C., German Patent 233,085 (1909), U. S. Patent 1,084,244 (1914), 1,169,597 (1916); Henckel, Austrian Patent 34,-816; Zacharias, A., German Patent 280,-474 (1914); Thickens, J. A., U. S. Patent 1,138,907 (1915); Zimmermann, B., German Patent 376,910 (1922); Parret, A. E., Newsprint from Baled Wood. Brief Account of a Canadian Mill's Experience with the Fish Process. *Pulp and Paper Mag. Canada* 34, no. 9:515 (1933); Enge, L., German Patent 296,-973 (1915); 296,949 (1915); 484,805 (1924); Kittelsen, T. and E., German Patent 324,053 (1919); Weisshuhn, C., German Patent 551,905 (1922); Possanner von Ehrenthal, B., German Patent 708,592 (1939); Rue, J. D., Paper Trade J. 53, no. 16:57 (1925); Lougheed, E. H., Pretreatment of Wood Before Grinding. *Pulp and Paper Mag. of Canada* 46, no. 3:165 (1945); Hyttinen, A. and Schafer, E. R. The Grinding of Hardwoods. Experiments on Eastern Cottonwood, Yellow Poplar, Sugar Maple, Black Tupelo, White Ash, Paper Birch and Sweetgum. *Tappi* 32, no. 2:79 (1949).

(4) Libby, C. E. and O'Neil, F. W. The Manufacture of Chemigroundwood Pulp from Hardwoods. *Tappi* 33, no. 4:161 (1950).

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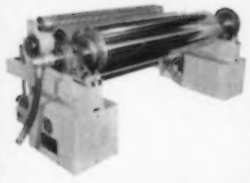
(6) Libby, C. E. and O'Neil, F. W., U. S. Patent 2,713,540 (1955).

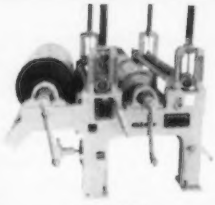
(7) Dentremont, A. E. Chemigroundwood Hardwood Pulping Process. *Paper Trade Journal* 139, no. 8:32 (1955). Heuer, J. H. The Commercial Production of Chemigroundwood for Newsprint. *Pulp and Paper Mag. Canada* 56, no. 12:170 (1955).

Dilts
COATERS



PL-600 POLYETHYLENE

GRAVURE OR AIR DOCTOR



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REVERSE ROLL

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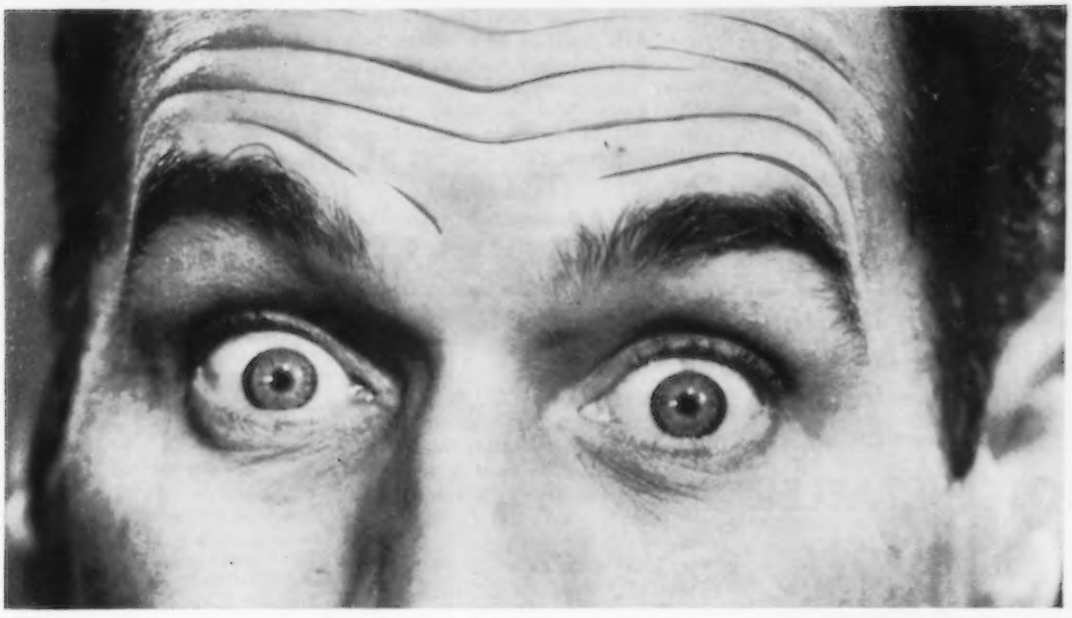
Dryer Felt EMERGENCY?



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Orton Corporation, Fitchburg, Mass.
Midwestern States
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West Coast
M. J. Maguire, Portland, Oregon
Southern States
R. S. (Bob) Davis, Greenville, S.C.

BRANDON DRYER FELTS

OBITUARIES

Robert C. Brown, 64, vice president of Cromwell Paper Co., Chicago, died April 23 at Columbia Hospital, Milwaukee, of complications following gall bladder surgery.

A native of England, Mr. Brown came to the United States in 1911. He worked for the Kimberly-Clark Corp. at Neenah 23 years before joining the Cromwell firm.

William L. Salmon, 50, president of the Salmon Paper Box Co., Matawan, N. J., died April 26 of a heart attack in the Perth Amboy General Hospital. Before establishing his own company, Mr. Salmon was associated for 17 years with H. L. Philo Corp., lithographers, in New York City.

Owen J. Brennan, 43, secretary-treasurer and co-partner of Seymour Paper Mills Inc., Seymour, Conn., was killed April 28 in an accidental 30-ft. fall from an overpass to the Connecticut Turnpike in Stamford, Conn.

Hamilton Garnsey Jr., 56, vice president and general manager of Goulds Pumps, Inc., Seneca Falls, N. Y., died April 26 after a brief illness. He joined the Goulds organization in 1923. For many years he was works manager and was a director of the company since 1932 and vice president since 1938.

Logan R. Herbert, 62, passed away April 30. In 1926 Mr. Herbert co-founded Midwest Machine Co. Which later merged with the Fulton Engineering Co. of Springfield, Ohio to become the Midwest-Fulton Machine Co., leading supplier of dryer drainage systems for paper machines. Mr. Herbert was the vice president and treasurer of the Midwest-Fulton Machine Co. until it was sold to the J. O. Ross Engineering Co. From 1930 till 1953 Mr. Herbert was also district representative of the Falk Corp. His two sons, John W., of Dayton, Ohio and George S., of Yellow Springs, Ohio are active in the paper industry, the former as assistant sales manager of Mead Papers, Inc. and the latter as president of the Patton Manufacturing Company.

See You in Boston
during the
Superintendents'
Convention

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Jim Smith
Larry Woodside
Tony Hyde
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STRUCTURAL AND ARCHITECTURAL DESIGN

REPORTS APPRAISALS ESTIMATES AND SURVEYS

PRICES OF MATERIALS

Aluminum sulphate:			
coml. bulk, c.l. wks.	cwt.	$2.00	/ —
iron-free, c.l. wks.	cwt.	3.55	/ —
Casein, acid prec.:			
dom. sh. pt. c.l. (30 mesh)	cwt.	56.00	/
Arg. ex. dock	cwt.	19.00	/19.50
New Zealand	cwt.	23.00	/25.00
Caustic soda:			
c.l. wks. solid, 76%	cwt.	4.80	/ —
flak. & grd. drums, c.l.	cwt.	5.20	/ —
liquid 50% tanks		2.90	/ —
liquid 73% tanks		3.00	/ —
China Clay			
dom., dry-grd., airfloat:			
325 mesh bgs., c.l. Geo.	ton	10.00	/12.00
300 mesh, bgs., c.l. Geo.	ton	13.50	/14.50
imp., white, lump, c.l. ex. dock		20.00	/35.00
Chlorine:			
single-unit tanks, works	cwt.	3.15	/ —
multiple unit, 2-5 cars per yr.		5.25	/ 4.05
Lime:			
hydrated, bulk, c.l. N.Y.	ton	24.45	/ —
quicklime, bulk, c.l. N.Y.	ton	21.20	/ —
Gum rosin:			
K, M, N, drums, c.l. Savan,	cwt.	7.80	/ 7.90
Rosin size:			
70%, gum & pale paste, tank cars, south, sh. pt.	cwt.	7.38	/ 7.48
Saltcake:			
dom. bulk, 100% anh. wks.	ton	28.00	/ —
Soda ash:			
light, 58% ash bags, wks.	cwt.	1.85	/ —
bulk, c.l. wks.	cwt.	1.55	/ —
Sodium chlorate:			
drums, c.l., wks.	cwt.	9.00	/ —
drums, l.c.l., wks.	cwt.	9.50	/10.50
Sodium peroxide:			
dms., c.l. E. of Miss.	lb.	.20½	/ —
l.c.l. (same basis)		.21	/ .21½
Sodium silicate, 40° Be.:			
tank-cars, wks.	cwt.	1.20	/ —
drums, c.l. wks.	cwt.	1.55	/ —
47° Be. WW.			
tank-cars, c.l. wks.	cwt.	1.90	/ —
drums, c.l. wks.	cwt.	2.25	/ —
Soybean, protein:			
chem. isol., wks. c.l. bags	lb.	.23	/ —
Starches:			
Corn, multiwalls, c.l. prod. plant:			
pearl	cwt.	6.49	/ 6.75
white, dextrins	cwt.	8.08	/ 8.20
chlorinated	cwt.	8.25	/ 8.35
potato, Idaho, c.l. wks.	cwt.	6.35	/ —
East, fr. all. 50 cents cwt.			
potato, Maine, f.o.b. wks.	cwt.	6.25	/ —
Sulphuric acid:			
60° Be. cbys. c.l. wks.	cwt.	2.00	/ —
l.c.l. wks.	cwt.	2.45	/ —
tank-cars, wks.	ton	18.60	/ —
Sulphur:			
crude, c.l. mines, contract,	long ton	23.50	/ —
f.o.b. vessels Gulf dock	ton	25.00	/ —
Sulphur dioxide:			
liquid, coml. cyl., wks.	lb.	.10	/ .12
multi-unit cars, wks.	lb.	.0535	/ —
Talc, fibrous grd., bags:			
c.l. wks., N.Y.	ton	28.00	/ —
l.c.l. wks., N.Y.	ton	31.00	/36.00
Titanium dioxide:			
anstase, c.l. dlvd. E. bags	lb.	.25½	/ —
l.c.l. dlvd.	lb.	.26½	/ —
rutile, c.l. dlvd.	lb.	.27½	/ —
l.c.l. dlvd.	lb.	.28½	/ —

for driving reliability . . .

No V-belt transmits power like *TEXROPE* BELTS with endless grommet construction

THICK, solid rubber cushion surrounds and protects grommets from heat, shock and other destructive factors.

Thick

Extra Strong

EXTRA STRONG, heavy twin grommets reduce wobble, have enough tensile strength to handle rated loads. They're precisely located to assure uniform load distribution.

TOUGH, bias-cut, with seams at bottom to prevent carcass distortion.

Tough

Sturdy

STURDY, straight sidewalls guarantee maximum gripping power, 33% more than other types of V-belts. Tendency to bulge is converted into gripping sidewall pressure—cast-iron sheave sidewalls confine the belt.

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Figures of the Week

PAPER PRODUCTION RATIO REPORT—American Paper & Pulp Assn. Figures

(Production as per cent of normal capacity)

COMPARATIVE WEEKLY SUMMARIES

	March 29	April 5	April 12	April 19	April 26
1958	90.3	89.6	87.8	86.5 r	89.0
	March 30	April 6	April 13	April 20	April 27
1957	97.2	96.1	96.2	95.1	88.6

r Revised.

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1958	85.5‡	88.5‡	89.5‡	—	—	—	—	—	—	—	—	—	—
1957	94.2	97.0	97.1	94.0	94.6	93.3	75.6	90.7	86.0	93.0	90.7	81.5	90.9

‡Preliminary.

COMPARATIVE YEARLY SUMMARIES

	1951	1952	1953	1954	1955	1956	1957	1958
Year to Date	101.6	95.5	94.4	93.9	95.5	101.4	95.7	87.8
Year Average	98.0	88.6	92.3	91.6	94.0	97.9	90.9	

All of the above data is based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available.

PAPERBOARD OPERATING RATIOS†—National Paperboard Assn. Figures

COMPARATIVE WEEKLY SUMMARIES

	March 29	April 5	April 12	April 19	April 26
1958	86	88	82	87	81
	March 30	April 6	April 13	April 20	April 27
1957	92	93	94	94	86

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1958	80	86	88	—	—	—	—	—	—	—	—	—	—
1957	91	94	94	92	93	91	72	94	91	97	92	79	90

† *Percents of operation based on "Inch-Hours" reported on a 6-day basis.*

SUMMARY OF PAPERBOARD STATISTICS—National Paperboard Assn. Figures

ITEM	THIS WEEK ENDING Apr. 26, 1958	LAST WEEK ENDING Apr. 19,1958	CUMULATIVE TO DATE Jan. 1 to Apr. 26, 1958
% Activity	81%	87%	85%
	Tons	*Tons*	*Tons*
Total Production	236,328	263,614	4,302,858
Liner	68,613	88,005	1,407,256
Corrugating Material	35,891	38,874	636,332
Chip & Filler Board	5,147	5,829	74,214
Total Containerboard	109,651	132,708	2,117,802
Folding	51,219	54,260	857,335
Set-Up	10,773	10,965	167,896
Special Food Board	23,829	27,294	408,434
Other	40,856	38,387	751,371
Total Boxboard	126,677	130,906	2,185,056
Total Orders	*Tons*	*Tons*	
Received	224,405	230,130	
Unfilled End of Week	326,592	336,737	

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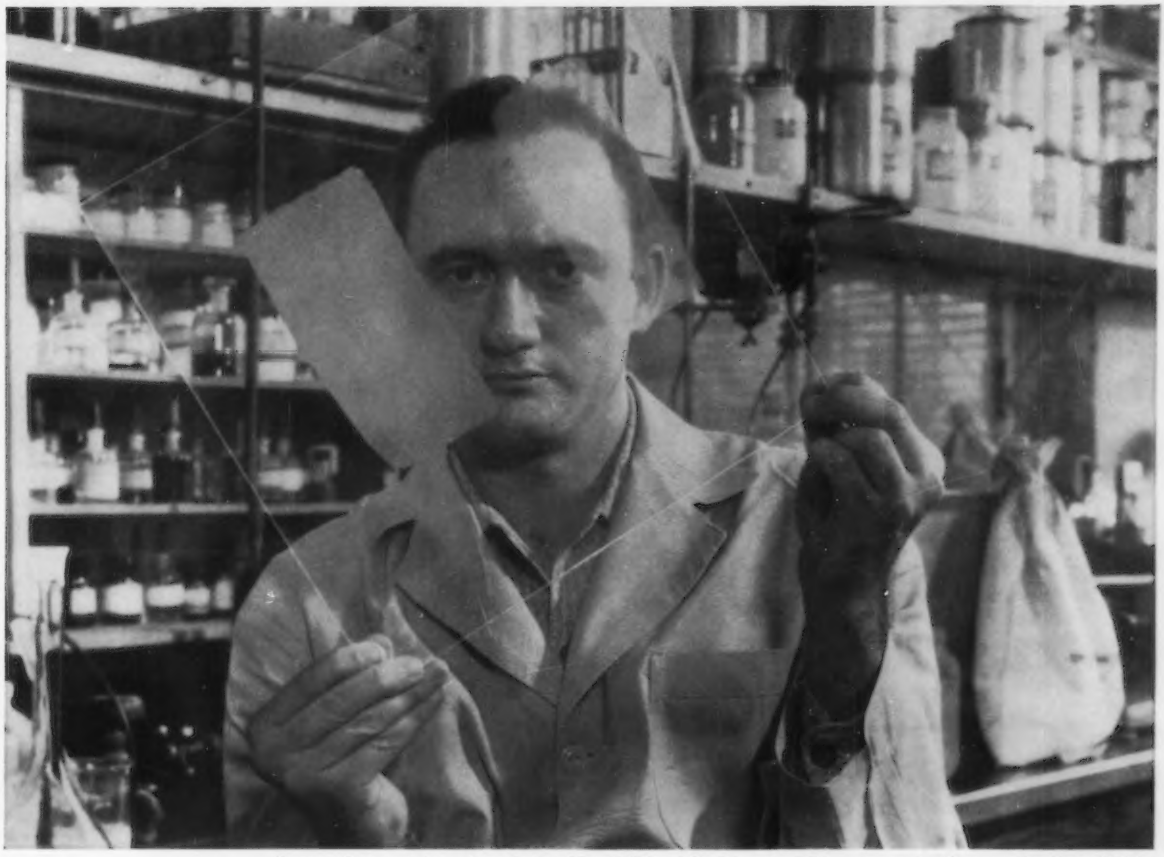
CHEMICAL PROCESS SYSTEMS — REFINERIES — SEWAGE SYSTEMS



Smears of size on glass show clarity of Ten-O-Film, right, almost invisible, compared with conventional starch, left.

Sure way to CLEAR, UNIFORM COATING

The highest degree of coating quality can be achieved with the new, improved Ten-O-Film starches.

These new starches possess unexcelled clarity, uniformity and film-forming properties. They are available in a series of fluidities to meet your exact requirements. Because of their high degree of viscosity stability at high solids, Ten-O-Film starches reduce setback and maintain adhesive strength, assure good performance. At lower concentrations Ten-O-Film starches assure superb structural film continuity and excellent results.

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Fine products for the Paper Industry: EAGLE® • FOXHEAD® • GLOBE® • TEN-O-FILM® and CLARO® starches. GLOBE® dextrines and gums.

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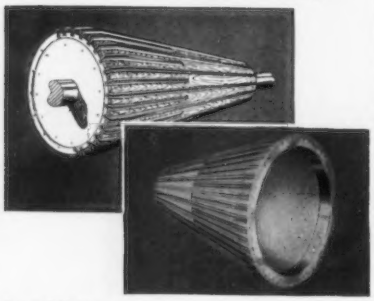
REVOLUTIONARY ADVANCE
In Jordan Plug Design

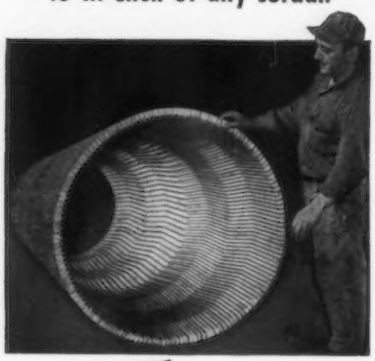


In addition to the strongest and most adaptable solid plug ever developed, Adapta-Plug is available in sleeve form for easy, economical conversion of old worn plugs.

E.D. Jones Adapta-Plug

Completely bandless, easily stripped and filled. Inverted-wedge-type slots hold bars firmly in place, eliminate hazards of slot wear and corrosion. Any desired edge available. Write for Bulletin EDJ-1094.

Complete ONE-PIECE assembly to fit shell of any Jordan



E.D. Jones FULBAR SHELL FILLINGS

Ideal filling for any Jordan, new or old, of any make. No keys or wedges needed. Easy to grind in. Many other advantages. Write for Bulletin EDJ-1094.

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PRICES OF FIBERS

MARKET WOOD PULP

SECOND QUARTER CONTRACT PRICES PER SHORT AIR-DRY TON

Delivered Basis

	U.S.	Canadian	Swedish	Finnish	Norwegian
Groundwood	$82.50/ 90.00	$82.50/ 90.00	$$90.00/ —	$$90.00/ —	$$90.00/ —
Bleached Gw'd.	$97.50/100.00	$97.50/100.00			
Kraft, Blchd.	157.00/ —	160.00/162.50	$157.00/162.50*		$157.50/ —
Kraft, Blchd. Hdwd.	152.00/ —		$137.00/ —		
Kraft, Semi-bleached	140.00/ —	140.00/ —			
Kraft, Unbl.	117.50/125.00	125.00/130.00	†125.00/130.00	125.00/ —	
Sulphite, Blchd. ..	155.00/ —	155.00/ —	*155.00/ —	*155.00/ —	155.00/ —
Sulphite Bl. Hdwd.	150.00/ —				
Sulphite, Unblchd. .	135.00/ —	135.00/ —	†135.00/ —	*130.00/ —	
Sulphite, Unb'l. Gl'sn		134.00/ —	†134.00/ —		
Soda, Blchd.	147.00/150.00	150.00/ —			

$ On Dock Atlantic Ports. * Freight allowed. † Varying Freight Allowances

NEW YORK RAG MARKET

PRICES NOMINAL

New Domestic Cotton Cuttings

Delivered Mill Basis

	Per 100 lbs.
No. 1 White Shirts	$13.50/$14.50
No. 1 Unblchd. Muslins	16.00/ 17.00
Blchd. & Unblchd. Underwears	15.00/ 16.00
No. 1 Light Cream Silesias	12.00/ 13.00
No. 1 Light Blue Overalls	6.50/ 7.50
Percales	6.00/ 6.50
No. 1 Light Prints	5.00/ 5.50
Suntan Khakis	5.75/ 6.75
Cottonades	3.00/ 3.50
No. 1 Washables	2.50/ 3.25

Old Domestic Cotton Rags

Delivered Mill Basis

	Per 100 lbs.
Mixed White	$3.25/$3.75
Cotton Pants & Overalls	2.25/ 2.75
Twos and Blues, Repacked	2.00/ 2.50
No. 2 Roofing	.60/ .75

COTTON LINTERS

Memphis Market

f.o.b. Oilmills

Week Ended May 2	Per 100 lbs.
Grade 1} n. a. 2}	
3}	$9.75/ $8.50
4}	8.00/ 7.50
5} 1 cut—felting	7.00/ 6.00
6}	5.50/ 5.00
7}	5.00/ 4.50

*Based on 73% cellulose.

OLD ROPE & BAGGING

(Prices to Dealers, f.o.b. N.Y.)

	Per 100 lbs.
New Burlap Cuts	$4.50/$5.50
Scrap Burlap	3.50/ 4.25
Australian Wool Pouches	5.00/ 5.50
Gunny	4.50/ 5.00
No. 1 Domestic Manila Rope	6.25/ 7.50
No. 1 Foreign Manila Rope	5.25/ 6.25
Domestic Sisal Strings	4.00/ 4.50

WASTE PAPER MARKET

Mill Prices, f.o.b. Trucks Shipping Point — Includes Brokerage

These quotations are a partial indication of the price range on volume tonnage in each market on the date specified, as gathered from major dealers and brokers. SPECIAL PACKINGS AND SPOT TONNAGE NOT INCLUDED. Prices nominal.

	New York	Boston	Chicago	Los Angeles
	May 5	May 5	May 5	May 5
No. 1 Mixed Paper	$5.00/ $7.00	5.00/ 7.00	4.00/ —	12.00/ —
No. 1 News	11.00/ 12.00	12.00/ —	14.00/ —	14.00/ —
Overissue News (Lg. size)	11.00/ 14.00	11.00/ 13.00	19.00/ —	18.00/ —
Mill Wrappers	10.00/ 13.00	10.00/ 12.00	7.00/ —	13.00/ —
Old Corrugated Containers	21.00/ 22.00	20.50/ 21.00	19.00/ —	20.00/ —
Super Resorted Kraft Paper ...	30.00/ 35.00	35.00/ 45.00	35.00/ —	45.00/ —
New Double Kr. Ld. Corr. Cuts	25.00/ 30.00	30.00/ 32.50	32.50/ —	30.00/ —
(Semi-chem. medium)	40.00/ 45.00	37.50/ 45.00	40.00/ 45.00	30.00/ 35.00
New 100% Kraft Corr. Cuts ...	50.00/ 55.00	50.00/ 55.00	50.00/ —	45.00/ —
New Br. Kraft, Env. Cuts	65.00/ 70.00	70.00/ 75.00	50.00/ —	50.00/ 55.00
New Br. Kr. Bag Waste Prntd.	55.00/ 60.00	55.00/ 60.00	50.00/ —	45.00/ 50.00
New Br. Kr. Bag Waste Unprintd	60.00/ 65.00	65.00/ 75.00	60.00/ —	45.00/ 50.00
No. 1 Groundwood Shvs.	21.00/ 25.00	20.00/ 25.00	14.00/ —	30.00/ 35.00
White Newsblanks	45.00/ 50.00	45.00/ 53.00	35.00/ —	55.00/ —
No. 1 Soft White Shvs.	55.00/ 60.00	60.00/ 65.00	55.00/ —	— / —
Super Soft White Shvs.	65.00/ 75.00	75.00/ 85.00	65.00/ —	— / —
Hd. White Shvs.	85.00/ 95.00	100.00/110.00	85.00/ —	85.00/ 90.00
Hd. White Env. Cuts	105.00/110.00	110.00/115.00	90.00/ —	100.00/110.00
Col. Tab. Cards	50.00/ 55.00	55.00/ 60.00	47.50/ —	37.50/ —
Manila Tab. Cards	60.00/ 70.00	70.00/ 75.00	65.00/ —	75.00/ —
No. 1 Col. Ledger	28.00/ 30.00	30.00/ 35.00	40.00/ —	20.00/ —
White Ledger	42.50/ 50.00	45.00/ 50.00	52.50/ —	45.00/ —
Mixed Book & Mag.†	15.00/ 18.00	17.00/ 19.00	12.00/ —	— / —
No. 1 Books‡	19.00/ 23.00	20.00/ 22.00	27.50/ —	— / —

† Includes Time & Life; no coarse groundwood. ‡ Not to exceed 10% of groundwood.

Something **NEW** in paper coating

A versatile new machine, designed to duplicate mill conditions and various types of coating operations, has recently been installed by Koppers to aid in the development of new latices for coated papers.

In addition, it will enable paper-coaters to evaluate and select the best possible formulations for coating their products—without loss of production time.

Here is a development in keeping with Koppers continued interest in the paper industry—an interest which has consistently resulted in outstanding customer service, because of newer, more modern equipment, excellent research facilities and highly trained personnel.

For more information, wire or write, Koppers Company, Inc., Koppers Bldg., Dept. PTJ-58, Pittsburgh 19, Pennsylvania. TWX Call Number . . . PG533

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Burst Strength Tester

For Papers or Boards

This instrument meets ASTM and TAPPI standards; also CCC Rule 41 (Cady or Mullen Test), with a record of more than 30 years service in the paper and board industry. Uniform pressure during 12 second cycle assures uniform test on papers or boards. Pressure registers in pounds per square inch on direct reading dial and remains at reading until next test is stated. Write for complete brochure describing operation in detail.

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Basis Weight Scales

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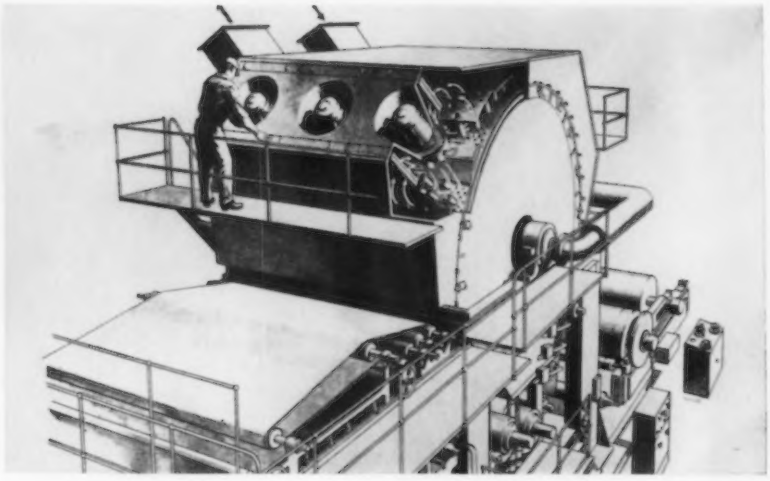


Swedish Yankee Hood Said to Boost Production

A compact hood for Yankee machines which is reported to radically increase the productive capacity of the machines, will soon be available in this country, from American SF Products, Room 507, 420 Lexington Avenue, New York City.

The Yankee hood is a self-contained unit with built-in circulation fans and heating units. Construction concepts of the unit make possible more efficient air impingement on the paper resulting in increased evaporation rates. The hoods are manufactured in Sweden by AB Svenska Flaktfabriken, manufacturers of Flakt pulp dryers.

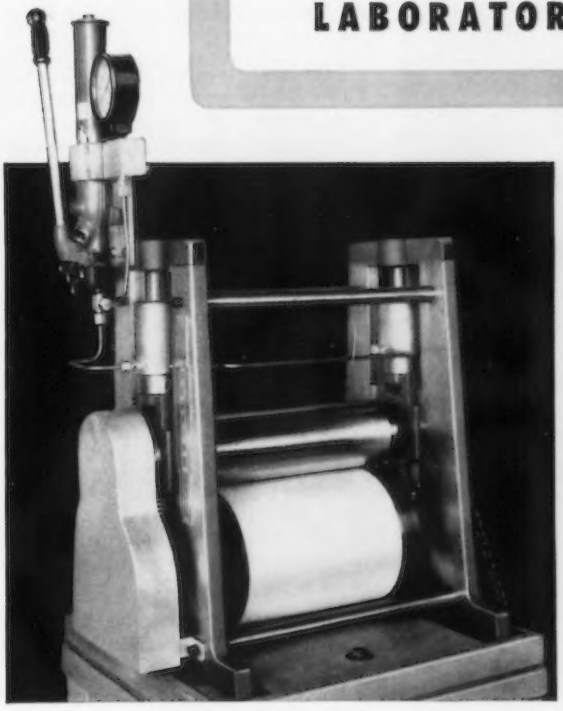
Low Range Universal Tester

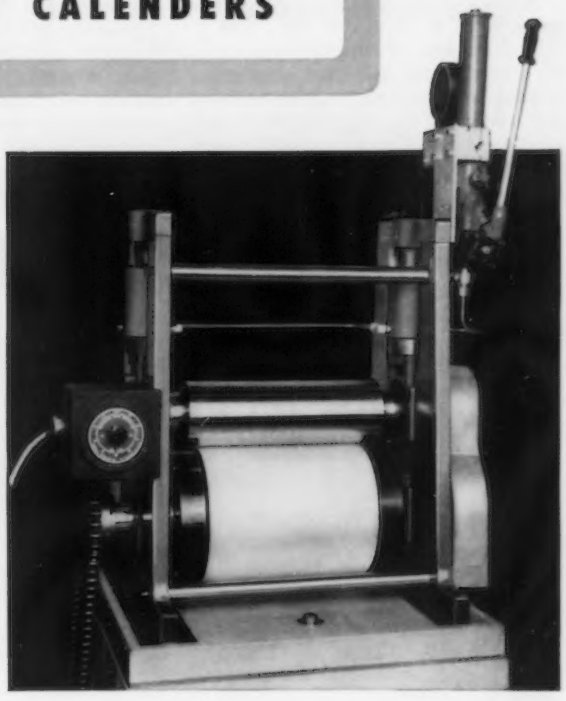
Development of a new 300-pound capacity universal tester has been announced by W. C. Dillon & Co., Inc. The compact laboratory instrument, which is accurate to within ½ of 1 per cent of the indicated readings, is reported to quickly and economically make tests in tensile, compression, transverse, or shear. It will handle paper, plastics, cardboard, and other low-strength materials.

The multi-low range tester operates on the principle of a calibrated pendulum. It features an automatic stress-strain recorder which draws a curve on a graph sheet, a built-in limit switch which prevents overrun, and it also indicates maximum applied load. Drawbar speeds of up to 20 inches per minute are selected by a stepless speed control.

Detailed engineering data and prices an available from W. C. Dillon & Co., Inc., 14620 Keswick Street, Van Nuys, Cal.

PERKINS BANTAM
LABORATORY CALENDERS





Tells you what to expect from a production calender. This small two-roll Laboratory Calender is equipped with hand-operated hydraulic pressure that insures uniform pressure each side of the machine . . . top steel roll and bottom cotton roll . . . both rolls running in anti-friction bearings.

The Perkins Bantam is constructed with steel plate frames, completely machined, and is mounted on heavy hardwood base lined with rubber pad for easy installation on laboratory table. Maximum pressure on top roll, 10,000 lbs. Can be supplied with motor drive.

Top steel roll equipped with electric heating unit.

B. F. PERKINS & SON, INC.
HOLYOKE, MASSACHUSETTS

Lab Demonstrations

(Continued from page 26)

made with different eucalyptus saligna pulps, and pulps of different eucalyptus species.

Alkaline Pulping of Sugar-Cane Bagasse.

The purpose of this investigation is to study certain variables in alkaline pulping of sugar-cane bagasse. Among the variables are cooking time, sulphidity, time to cooking temperature, and differences between various methods of depithing.

The effect of these variables will be measured by yield of acceptable fiber, bleachability of resultant pulps, and physical characteristics of resultant fibers.

Airphoto Techniques in Planning Logging Roads.

Whether a road costs $5,000 or $500,000 per mile, the proportional costs of construction as influenced by terrain are comparable. The airphoto interpretation techniques that have been successfully used in the reconnaissance phase of state and federal highway construction programs can be adapted to logging road construction planning. If foresters currently employed are given the opportunity to learn these techniques and then are permitted to engage in such work as a full time occupation undoubtedly thousands of dollars can be saved by reduction in the transportation costs in timber harvesting activities.

Moisture Removal from Cellulose Fibers (Made possible by a grant-in-aid from Hercules Powder Co.).

As water is removed from a suspension of pulp fibers surface tension forces tend to pull the fibers together until their proximity, one to another, is such that fiber to fiber bonds of a secondary valence nature are formed.

The major objective of this work is to remove water from wet sheets of pulp by methods which will negate the effects of surface tension and thus inhibit fiber to fiber bonding. The dried sheets will then be tested to measure the development of various physical properties at various stages of dryness.

The tests are being performed on an unbeaten pulp and also on a well fibrillated pulp in hopes that information can be obtained on the importance of fibril entanglement in strength development of pulp.

Effects of Surface Active Agents on Drainage, Sheet Formation and Fiber Bonding.

It is known that certain solutes known as surface active agents even when present in very small amounts can alter the surface energy of solutions.

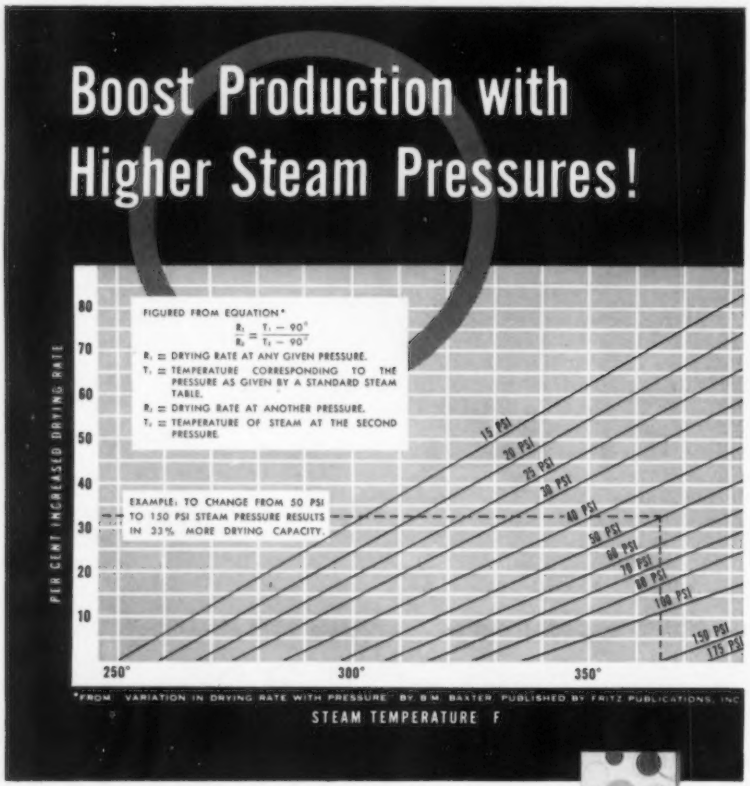
In this study the effects of surfactants of the anionic, cationic, and non-ionic groups on drainage, physical strength properties, and drying characteristics of sulphite pulp have been investigated.

The surfactants were added to the pulp slurry after the pulp was beaten in a TAPPI standard beater. Drainage was studied by use of the Canadian standard freeness tester as well as by use of the Noble and Wood sheet machine. Physical strength properties were investigated by making standard handsheets in the British Sheet Machine and testing the handsheets by TAPPI standard methods. Drying characteristics were studied by drying the pulp on a specially designed temperature controlled hot surface which was placed on an analytical balance.

Pulp Evaluation Using the Bauer-Mead Refiner.

The objective of this work is to devise a laboratory procedure for pulp evaluation using the Bauer-Mead refiner. Various pulp consistencies and refining times are used and a set of optimum conditions determined from the results obtained.

It is hoped that a rapid evaluation



Want to speed up your drying, boost output on your machines? This chart shows what can be achieved.

Isn't it time you investigated high-pressure Lukenweld drier rolls? Their all-welded construction permits safe operating pressures of over 200 psi. Lukenweld driers have no bolted end plates, no gaskets to blow. Maintenance costs are cut. They give uniform drying over entire light gage shell surface. Start-up time is fast.

Lukenweld driers—double shell, including the Yankee, and single shell—come *in any size*, subject only to shipping limitations.

FACTS YOU CAN USE -- New illustrated booklet, WELDED STEEL DRIER ROLLS, gives you helpful information. Write Lukenweld, Room 175, Coatesville, Pennsylvania.

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technique can be devised. A technique which can be useful in cases where it is not necessary to use the more time consuming TAPPI standard method.

Sawdust as a Component of Paper Furnish.

This investigation is concerned with the utilization of bleached sawdust, both hardwood and softwood, as a possible component of certain paper grades.

The first variable to be studied is the effect of sawdust size on its bleachability and on the characterisitc properties which it imparts to paper.

Bleaching Pulp in an Electrolytic Cell.

This project is being conducted to determine the practical and economical aspects of bleaching pulp in an electrolytic cell. A study will be made of the effect on bleached pulp strength and brightness of such bleaching variables as type of pulp, consistency of pulp, type of metal for electrodes, type of electrolyte, current density and bleaching time.

This represents a continuation of work that has been done at the University of Maine. The major difference between this project and the previous work is the elimination of a diaphragm in the cell, and the use of other metals to replace the original platinum electrodes.

Study of Some Variables in the TAPPI Standard Handsheet Method.

This work is being done to determine the effect on the actual value and reproducibility of test results when certain of the basic steps in the standard method for making handsheets are not strictly adhered to.

The basic conditions which were varied are those which are specified for (1) pulp consistency in the handsheet mold, (2) stirring of the stock in the mold, and (3) pressing of the sheets after they are couched from the wire.

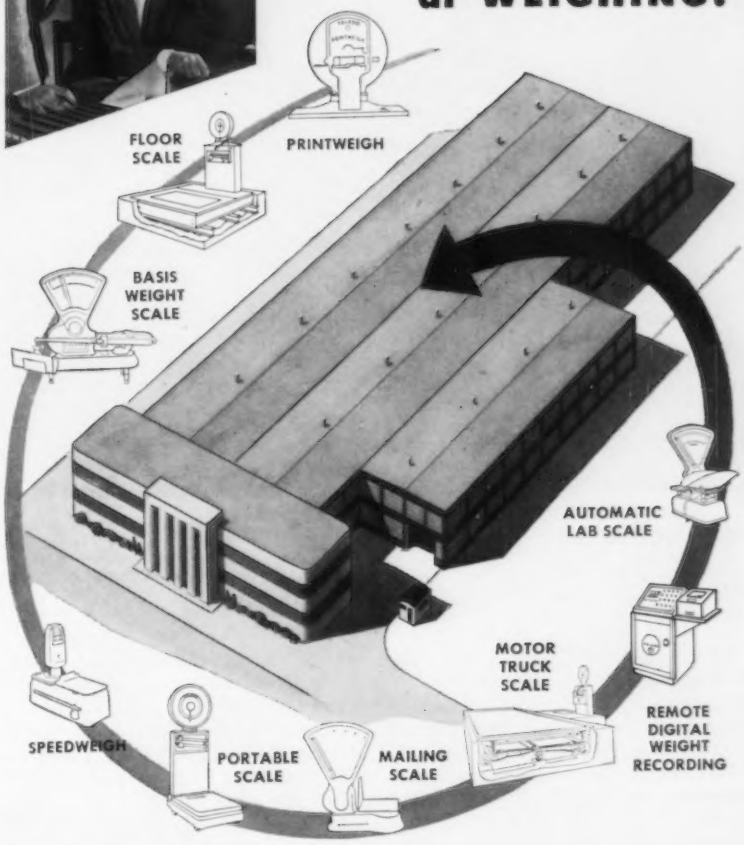
The results of tests made on the handsheets are compared with those obtained on "normal" or standard handsheets.

Study of Fiber Adhesion to Paper Machine Press Rolls (Sponsored by Stowe-Woodward, Inc.).

This study is a continuing investigation to determine the factors that influence fiber adhesion to paper machine press rolls. The results obtained during this phase of the work show a correlation between the degree of electronegativity exhibited by some press roll covering materials, under the influence of certain paper making chemicals, and the reputed degree of fiber adhesion to the surface.

Studying Costs? It pays to start with a

Plant-Wide Look at WEIGHING!



You can lessen the impact of rising costs by making sure your scales are doing the best possible job. Remember that weighing today is not a job for isolated scales—it's a vital element in your overall cost control system.

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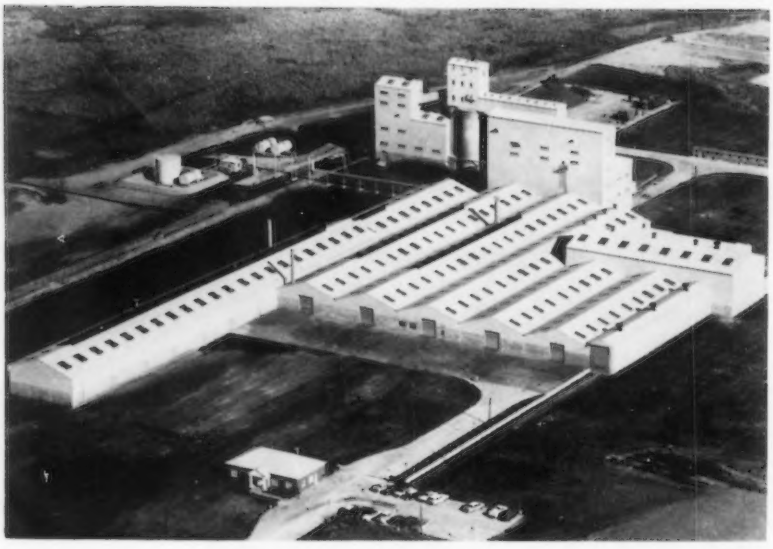
NEWS OF SUPPLIERS



New Refractory Plant . . .

. . . of Harbison-Walker Refractories Co., world's largest manufacturer of refractories, is a basic refractories plant at Hammond, Ind.

Chicago Bridge & Iron Co. has announced the purchase of Conkey equipment, patents, applications, drawings, patterns and records from Henry Hunter and George Dickey of New York.

Evaporator, crystallizer and filter equipment previously sold by the CB&I Conkey Division, which has now been integrated with CB&I operations, will be designated hereafter as Chicago Bridge & Iron Co. evaporators, crystallizers and filters.

Messrs. Hunter and Dickey, former owners of the Conkey patents and other property, have been retained by CB&I for a period of five years in consulting capacities. Former Conkey Division employees Henry Lankenau, Harold Jacoby and Anthony Chirico have joined CB&I's New York Sales Staff.

James Mair, who has for the past two years been located in CB&I's Chicago sales office, has moved to New York to round out the new sales staff for CB&I processing equipment such as evaporators, crystallizers and filters.

Huyck Felt Workshop No. 6 . . .

. . . held by Huyck Felt Co. in Rensselaer, N. Y., played host to 22 papermakers representing a variety of mills in the United States and Canada. During this session, the second workshop of 1958, the 136th graduate of the program received his diploma.

Morris Machine Works, Baldwinsville, N. Y., manufacturers of heavy-duty slurry and dredge pumps, has appointed Howard W. Jeffcock as assistant to the president. He relinquishes his present position as district sales manager in upper New York State to assume his new executive responsibilities.

De Laval Steam Turbine Co., Trenton, N. J., has transferred W. S. Senkus from the Chicago district sales office to the headquarters of turbine sales department in Trenton. In his new position, Mr. Senkus, a veteran in turbine and turbo-generator sales, will assist field sales offices in the promotion and sales of turbines and generators.

C. A. King

H. H. Shepherd

Bird Machine Co., South Walpole, Mass., has elected Calvin A. King first vice president and Henry H. Shepherd vice president in charge of sales.

Mr. King has been associated with the company for 12 years, recently as assistant to the president and formerly as manager of the Bird Research and Development Center.

Mr. Shepherd has been with the company for over 20 years and was general sales manager prior to his election as vice president. He formerly was in charge of centrifugal and filter sales at the Evanston, Ill. office.

Sandy Hill Iron & Brass Works, as part of its celebration of its 100th year in business, put on a "Centennial Follies" at the Hudson Falls, N. Y., Central School, in which the employees of the company participated.

Woven in among the historically authentic tableaux were skits and songs depicting the atmosphere to times during the last century—civil war scenes, a minstrel show, an old-time movie skit, the roaring 20's.

Pilot-Plant Area
. . . of Diamond Alkali Company's new technical service laboratory, Painesville, Ohio, for the pulp and paper industry is a compact installation featuring modern equipment, layout simplicity and operational flexibility. Shown here (from left to right) are: flat screen with two storage tanks, two cu. ft. digester equipped for indirect heating with liquor-circulating system and steam heat exchanger, blow tank for receiving cooked chips, disk refiner for defibering treated chips, and oil-fired package steam boiler for generating process steam at 250-p.s.i.

Chicago Bridge & Iron Co. has named Thomas R. Tucker Jr., formerly of its Birmingham Erection district, to the company's Atlanta sales office.

F. Dickson
Black-Clawson

F. B. Johnson
Montague Mach.

Black-Clawson Co. has appointed Frank Dickson to the recently established position of application engineer, suctions rolls and vacuum equipment. As a specialist in suction roll engineering, Mr. Dickson now concentrates all of his energy on this subject and is working closely with customers and Black-Clawson design and production engineers on all suction roll and vacuum equipment applications.

Mr. Dickson is located at Black-Clawson's Paper Machine Division, Watertown, N. Y. His special knowledge and advice are available, however, to all other divisions and affiliates of the company, including Black-Clawson (Canada) Ltd. and Black-Clawson International in England.

Montague Machine Co., Turners Falls, Mass., has promoted Farrell B. Johnson from sales engineer to sales manager.

Do You Know

What company has groundwood, sulphite, kraft and semi-chemical pulp operations on the one plant site? We think there is only one such mill. Answer below.

Bathurst Power & Paper Co. Ltd. Market products are boxboard, container board and unbleached sulphite pulp.

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Business Papers . . . Bond, mimeo, duplicator, ledger.

Bristols . . . Index, post card.

Converting Papers . . . Label, tablet, envelope, lining, tabulating card, coating raw stock.

Bleached Boards . . . Cup, coated and uncoated carton boards, converting and barrier boards, file folder and tag stock.

Kraft Papers . . . Bag, multi-wall sack, envelope, asphalting, gumming, interleaving, waxing.

Containerboard . . . Linerboard and corrugating medium.

Market Pulp . . . Bleached and unbleached sulphate.

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1—48" 6-color Hoerich-Cottrell Press. 4-Flexo—2 Rotogravure.
1—50" Hudson-Sharp 4 color Flexo Press.
1—36" 3-color Flexographic Press
1—32" 4 color Heinrich Flexographic Press.
1—31½" 4-Color Heinrich Flexographic Press.
1—31" two color Wolverine Flexo-Printer
1—30" 4 Color Kidder Flexographic Press
1—30" Kidder 6 station Flexographic press
1—26" 4 color Kidder Flexographic.
1—39½ Hobema (German) Press, 3 colors plexo, 1 color gravure.
1—24" 4-Color Kidder Celloprinter
1—7" Young Label Printer

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1—52" Lawson, Auto Spacer.

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1—62" 26-2A with 100 score cutting units
1—62" 26-3A.
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1—52" Parry Liner with Reeves Drive.
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1—2 Web, 1—3 Web Paper Converting Co.'s. Jr. Dispenser Napkin Machines
1—Diamond Paper Straw Making Machine Model-A.
1—Potdevin Model 111-CF & S Cellophane Bag Machine.
1—Potdevin Garment Bag Machine, Model 224, Ser. #388. Size 5456-302.
1—Roto Model C Cellophane Bag machine
1—48" Hudson Sharp Embosser-tinter.
1—48" Unicraft Embosser
3—Waldron Embossers; 1—22", 1—46" & 1—60" (latter two heavy duty) A-28

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BUSINESS STAFF

Arthur E. Gordon, Business Mgr.

Francis J. Gordon
49 West 45th Street, New York 36, N. Y. Plaza 7-2370

Frederick B. Grosse Production Mgr.

Alrick Man
49 West 45th Street, New York 36, N. Y. Plaza 7-2370

H. K. Vinton
CHICAGO 3, ILL.: Room 1020, 79 West Monroe St. CEntral 6-2784

H. L. Poulton
PITTSBURGH 11, PA.: 610 Pennridge Road. Hemlock 1-1571

McDonald-Thompson Company
SAN FRANCISCO, CAL.: 625 Market St. YUkon 6-0647
LOS ANGELES, 5, CAL.: 3727 West Sixth Street. DUnkirk 7-5391
DENVER, 2, COLO.: 223 Colorado Nat'l Bank Bldg. KEystone 4-4669
SEATTLE, 4, WASH.: 1008 Western Ave. MA 3-766
PORTLAND, 1, ORE.: 912 S. W. Market St. CA 2-5146
TULSA, 4, OKLAHOMA: 2010 So. Utica. RIverside 3-1981
HOUSTON, 6, TEXAS: Room 214, 3217 Montrose Blvd. JAckson 9-6711
MIAMI, FLORIDA: Hal Moore, Printup & Assoc., 1006 Langford Bldg. Phone:—FRanklin 9-2668, Herbert Morgenbesser Kohlgarten 3 Hamburg—F. U., Germany
Publishing & Distributing Co., Ltd. 177 Regent Street, London W 1, England

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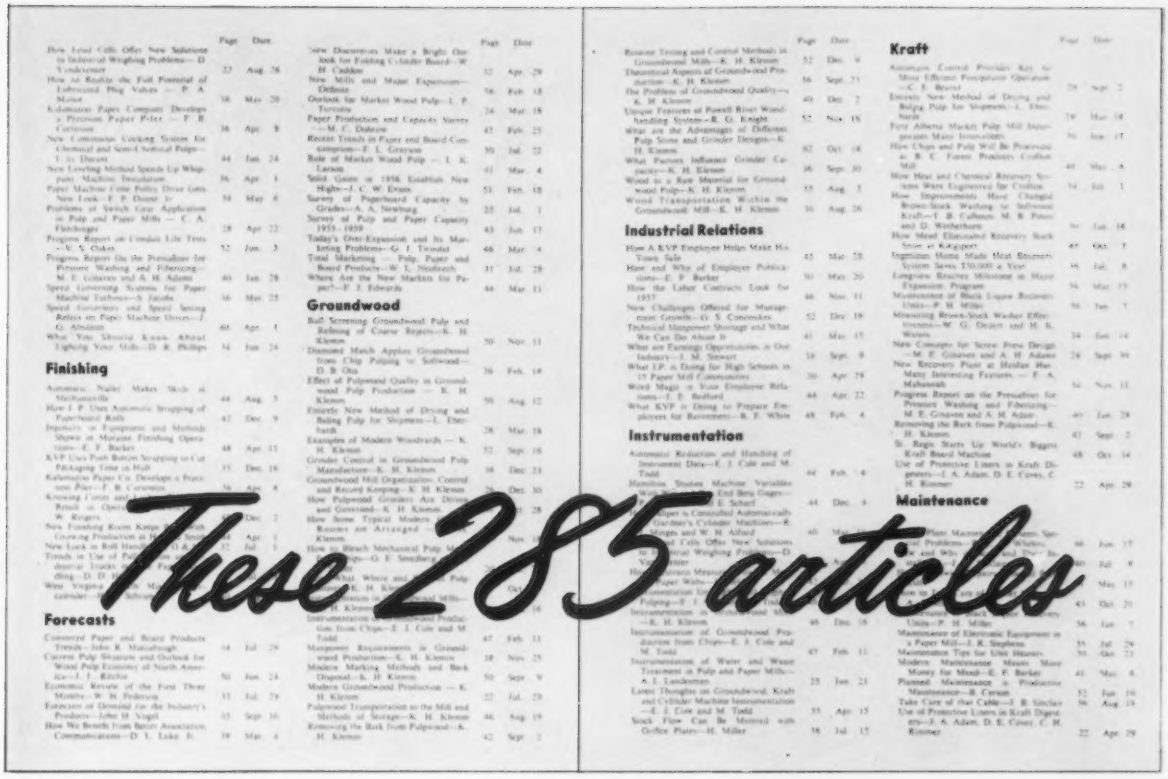

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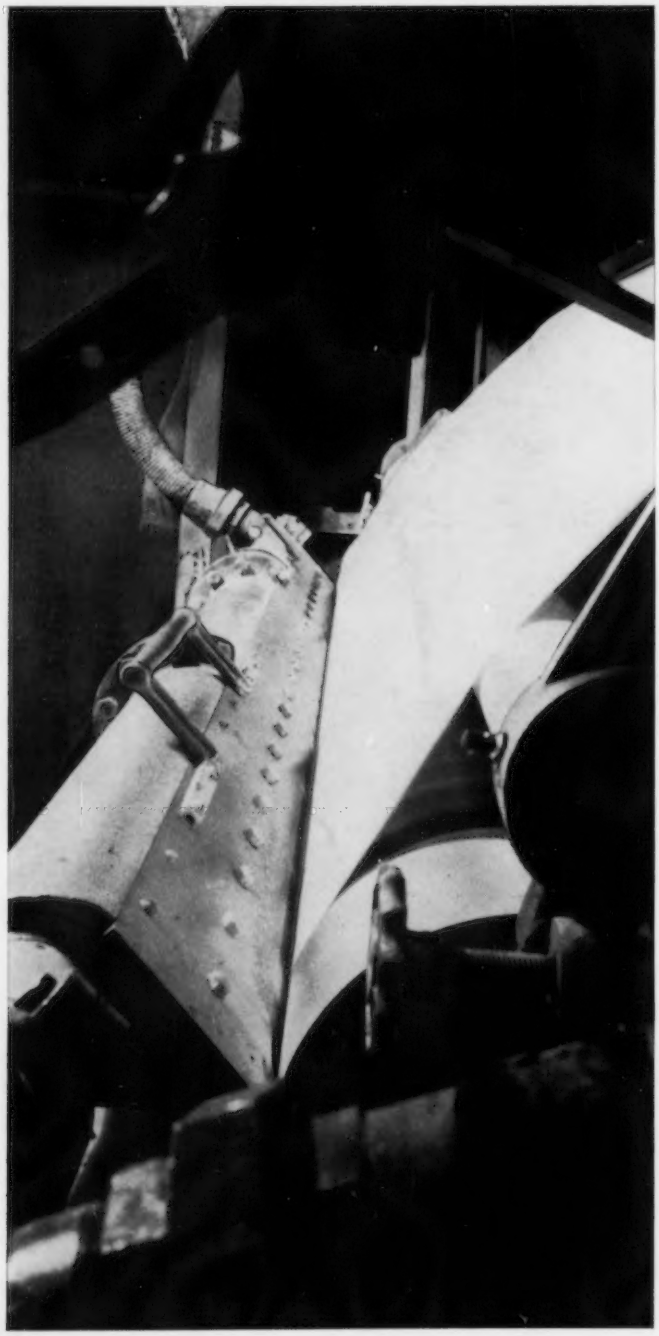

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